EFFECT OF SELECTED EXTROCEPTIVE STIMULUS (NOISE), ANXIETY AND DEPRESSION ON MENSTRUAL PATTERNS

ABSTRACT

THESIS SUBMITTED FOR THE DEGREE OF

Doctor of Philosophy

IN

PSYCHOLOGY

BY

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UNDER THE SUPERVISION OF

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ALIGARH (INDIA)

1987

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ABSTRACT

The present study was designed to investigate the effect of noise, anxiety and depression on menstrual patterns, namely, menstrual cycle length, menstrual duration and feeling of menstrual discomfort. It also takes into account the effect of age at menarche, age of the subject and menstrual irregularity on the same three aspects of menstrual patterns. More precisely, it was intended to study the influence of external variable (noise) and personality aspects (anxiety and depression) on menstrual patterns. Such studies have not been conducted in our country though they are immensely needed to help women in their adjustment to various spheres of life.

An exploratory study was conducted to determine the influence of noise on the three aspects of menstrual pattern. Within the constraints that existed (the noise intensity had to be kept well below tolerance limit; the duration could not be allowed to exceed beyond 30 minutes), it was inferred that noise cannot be taken as an independent variable to study menstrual pattern.

The other independent variables were anxiety, depression,

age of menarche, age of subjects and irregularity of occurrence of menstruation. Menstrual cycle length, menstrual duration and feeling of discomfort were the dependent variables.

The sample consisted of 275 undergraduate and postgraduate women students of Aligarh Muslim University, Aligarh. The mean age of the subjects was 21.26 years.

Design of the study

The present study, as stated earlier, was conducted to investigate the influence of independent variables (anxiety, depression, age of menarche, age of subjects, and menstrual irregularity) on the three aspects of menstrual patterns. Each independent variable was dichotomised to make it amenable to factorial design so as to obtain F ratio.

The hypotheses to be tested were as follows:

(1) Anxiety and depression would influence menstrual cycle length, duration and feeling of discomfort.

(2) The interaction of the independent variables would significantly influence each of the dependent variables.

(3) Anxiety, depression and age of menarche would influence menstrual cycle length, duration and feeling of discomfort.

(4) The interaction of the independent variables would significantly influence each of the dependent variables.

(5) Anxiety, depression, and age of the subject would influence menstrual cycle length, duration and feeling of discomfort.

(6) The interaction of the independent variables would significantly influence each of the dependent variables.

(7) Anxiety, depression and irregularity and influence menstrual cycle length, duration and feeling of discomfort.

(8) The interaction of the independent variables would significantly influence each of the dependent variables.

Analysis of variance was computed in order to determine the significant differences, and where the results were found to be significant, t-test was used. It was found that:

(1) Anxiety and depression did not influence menstrual cycle length. Depression influenced menstrual duration and feeling of discomfort.

(2) The interaction of anxiety and depression significantly influenced the menstrual duration and feeling of discomfort. Interaction of anxiety and depression did not influence menstrual cycle length.

(3) Anxiety, depression and age of menarche did not influence menstrual cycle length. Depression influenced menstrual duration, while anxiety and age of menarche did not influence the duration.

(4) Interaction of anxiety x depression affected menstrual

duration, but it did not effect the feeling of discomfort.

(5) Anxiety, depression and age of subject did not influence menstrual cycle length. Depression effected menstrual duration and feeling of discomfort.

(6) The interaction of depression and age of the subject affected the duration. No interaction effect was observed in the feeling of discomfort.

(7) Anxiety, depression and irregularity did not influence menstrual cycle length, duration and feeling of discomfort.

(8) The interaction of the anxiety, depression and irregularity did not significantly influence menstrual cycle, duration and feeling of discomfort.

Major Findings and Suggestions

Depression emerged as the most important variable that influenced menstrual duration and feeling of discomfort:

(1) An in-depth study of factors responsible for shortening menstrual duration needs to be conducted, both at the psychological level and at physiological level.

(2) The girls should be imparted education related to the process of menstruation before they attain the age at which the menstruation may start. Lack of proper information may pose various adjustment problems for them.

(3) Strategies have to be evolved to lessen depression among women and to educate them. Psychological

techniques of behaviour modification may be used. Yogic exercises may be useful for reducing the feeling of discomfort. Women should understand the changes which take place during different phases of the cycle, so that they can evolve their own strategies to reduce the feeling of depression.

(4) Psychologists should not solely depend on the classification and concepts commonly used by gynecologists to study the impact of menstruation on behaviour. More intensive studies are needed to properly understand the behavioural aspects related to menstruation.

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CHAIRMAN

DEPARTMENT OF PSYCHOLOGY
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ALIGARH-202002

the 27th day of November 1987

TO WHOM IT MAY CONCERN

This is to certify that Miss Masooma Khatoon worked under my supervision for her Ph. D. Thesis "Effect Of Selected Extroceptive Stimulus (Noise), Anxiet, And Depression On Menstrual Patterns ".

Miss Khatoon has completed all the formalities of attendence and residence and her work is fit for submission.

Dr. Sultan Akhtar
Professor of Psychology

ACKNOWLEDGEMENT

I express my deep sense of gratitude to my Supervisor Professor S. Sultan Akhtar (Chairman, Department of Psychology, Aligarh Muslim University, Aligarh) for his encouragement and able guidance. His analytical approach and critical evaluation immensely helped me in various ways.

I am grateful to Professor Mahmood Alam Raz, Dean, Faculty of Social Sciences, Aligarh Muslim University, Aligarh, for extending all facilities to me to carry out this work.

I am extremely thankful to Mrs. Hamida Ahmad, Reader, Department of Psychology, A.M.U., Aligarh, who has been a constant source of inspiration. She made valuable suggestions for the improvement of the text.

I would like to extend my sincere gratitude to my brother, Mr. S. Waseem Haider, for providing financial assistance, without which this work could not have been completed.

I also wish to express my sincere thanks to my mother and sister Mrs. Malika Khatoon for their encouragement and moral support.

I would next like to thank my colleague Miss Priti Vadra, Research Scholar, Department of Psychology, AMU, Aligarh, for the cooperation and help.

I also wish to express my thanks to Mr. Ashfaq Ahmad for helping me with statistical analysis, and to Mr. Mashhood Alam Raz for typing the manuscript.

Last but not the least, I would like to thank all those students who participated in the investigation and made this work possible.

Masooma Khatoon
MASOOMA KHATOON

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CHAPTER I

INTRODUCTION

The controversies related to equality of sexes has agitated the minds of philosophers, politicians, scholars and women activists. Evidence has been put forward by both the sides and, to a great extent it has been accepted that there hardly exists any difference between them with regard to mental abilities. Viewing the problem in correct perspective, it would impress the unbiased scholars with the fact that whatever and wherever differences exist, they may be attributed to early child rearing practices and socio-cultural conditioning. These practices have been in vogue since time immemorial with the result that the perceptions have become tinted and differences are perceived accordingly. Our point of view is amply vindicated by the 'Socialization Ideology' hypothesis propounded by Perrucci, Potter and Rhoads (1978). It has also been observed that sex-typing influences participation in family roles and joining labour force (Wrigley and Stokes, 1977).

It is also important to note that the differences between the two sexes exist in terms of employment patterns, occupations entered, financial returns and unemployment rates (Women's Bureau, 1979). Almquist (1979) has pointed out that women are not paid as much as their men counterparts. Also educated women obtained lesser returns in occupational status (Spaeth, 1977).

It is quite evident that women have to face many frustrating situations in their lives and they have to evolve adjustment mechanisms to counteract such stresses and strains of life.

But overt difference between the two sexes is a reality and the differences are mainly physiological in nature and start at the age of puberty. Menstruation is a physiological process which is related to procreation and it is probably the most significant process during the life span of a woman. It is unfortunate that a purely physiological process has been misconstrued and interpreted ambiguously. In many regions of India a mensturating woman is required to eat her meal separately. They may not be allowed to participate in religious prayers. Incidently, such a belief is universal and it is contended that the menstruating woman is unclean, dirty and often taboos are associated with such people (Bardwick, 1971). Ignorance adds fuel to the fire and further complicates the matter. In such a case, it is desired that we explain the term scientifically. Clear understanding may be helpful to women in adjusting to their life and work.

MENSTRUATION AS A PROCESS

Dawn (1980) defined menstruation as "the monthly vaginal bleeding coming at an interval of about 28 days from the oestrogen-progesterone primed uterine endometrium". This process continues during the reproductive years except during pregnancy and some times during lactation. Clark (1981) reported

menstruation to be a regular process of preparation for pregnancy which is repeated every month except when a woman actually is pregnant. This physiological process starts from the beginning of sexual maturity at puberty and continues till menopause. Similar views have been expressed by Jones (1978) who contends that menstruation is the "cyclical shedding of a progestational endometrium accompanied by blood". It is important to note that every vaginal bleeding may not be considered as menstruation because the significant aspect is oestrogenated endometrium which may occur for a few years after menarche and last till the onset of menopause (Dawn, 1980).

The menstrual process is influenced by the interaction of hormonal secretions of pitutary and ovary. This leads to a series of changes in the ovaries and uterus. Regulation of normal menstrual cycle depends on striking a balance between the hormonal secretions of the two glands. The disbalance may lead to irregularity or absence of the periods or any other menstrual disorder.

The menstrual cycle starts at the onset of menstruation and ends at the recurrence of the next one.

The ovum in between this period is released on an average on the 14th day of the menstrual cycle and if the egg is not fertilised during the remaining fortnight then the endometriam (tissue lining of the womb) is ejected through the blood (Hawkins and Bourne, 1971). This completes the menstrual cycle.

MENSTRUAL CYCLE LENGTH

Researches done by gynaecologists on the menstrual cycle length show that it is usually one of 28 days. Schoeneck (1957) believes that only 10-15 % women follow the 28 ± 2 day cycle. Hawkins and Bourne (1971) is of the view that an exact cycle of 28 days is present only in a small proportion of healthy women. They reported that there may be departure of two or three days from the 28 day rhythm, while in others the cycle may be of 21 days.

Israel (1976) studied the menstrual cycle of obstetrics and gynaecologic patients and found it ranging between 26 to 34 days with an average of 28.6 in 80 % of the sample. Jones (1978) is of the view that menstruation normally occurs at the interval of 24 to 34 days (mean = 28). Scommega and Dmowski (1977) believe that the length of menstrual cycle varies among women and does not remain constant throughout the reproductive years in the same individual.

The cycle of 21 days may be considered normal unless accompanied by some pathological symptoms. Thus it can be inferred that, by and large, menstrual cycle conforms to 28 days,but the variation may not be completely ruled out.

MENSTRUAL DURATION

Another important aspect of menstruation is the duration of the periods. Dawn (1980) reported that the duration of menstrual

bleeding extends from the first to fourth or fifth day of the cycle. The duration of the period, according to Jones (1978) ranges between 1 to 8 days with a mean of five days. The general consensus is that the duration of menstrual bleeding lasting between 2-7 days is considered to be normal.

Like the menstrual cycle length, the duration of menstrual bleeding is not constant in the same individual. It also varies from individual to individual and even in the same individual from time to time. The fluctuations may be attributed to a host of factors such as age, health, nutrition, climatic changes, emotional experiences, psychological stress, etc. The duration of menstrual bleeding has been reported to vary considerably with the individual, but remain in the same person from month to month (Hawkins and Bourne, 1971). It has been reported that young women suffering from iron deficiency may have excessive bleeding with long duration (Dawn, 1980; Hawkins and Bourne, 1971).

MENSTRUAL DISCOMFORT

Human beings are self-adjusting organisms. Man is required to adjust to both the internal as well as the external environments. During hunger the contraction and expansion of the stomach muscles give rise to the feeling of pain. During cold weather, shivering may be controlled by bringing together all the parts of the body. It could be logically proved that the

organism has to evolve techniques to adjust to the internal and external environment. It is also observed that physiological changes taking place inside the human organism result in a sort of warning to the individual. Stretching the same logic to the physiological process of menstruation, it is observed that the change is accompanied by feeling of discomfort. Prior to and during the periods, the feeling of discomfort could also be explained in terms of hormonal interaction that takes place between the ovary and pitutary on the fourteenth day before the onset of the next menstrual period. These physiological changes take place inside the human organism and it is felt by the individual as uneasiness, minor headache or backache, laziness, etc., prior to the onset of menstruation. These symptoms during the periods are termed as dysmenorrhoea by gynaecologists. This gynaecological term is referred to as feeling of discomfort by psychologist and the same term is used by psychiatrists as distress. Gynaecologists classify dysmenorrhoea as primary and secondary. This classification is based on the severity of the symptoms. The psychologists classify the feeling of discomfort in terms of its intensity. Sherif (1976) is of the view that relationship between menstrual and premenstrual distress and attitudes regarding menstruation musculinity-feminity and other similar variables is quit complex, and may be mediated by many factors including religious orientation, self esteem, social competence, traditional vs. modern attitudes etc.

Attempts have also been made to study the degree to which the environmental factors relate to menstrual cycle symptoms. Moos (1977) reported that same type of symptoms are more physiologically based (e.g., pain, water retention, autonomic reaction), whereas others are more environmentally based (e.g., change in concentration and general behaviour). The former leads to physiological and the later to psychological changes. It is more likely that physiological and environmental factors usually interact or combine to result in high or low levels of reported complaints.

PREVALENCE OF MENSTRUAL DISCOMFORT

Researchers differ in their views regarding the prevalence of menstrual discomfort. Kessel and Coppen (1963) reported that only 12 % suffer from severe form of dysmenorrhoea. While Andersch and Milson (1982) found that 72 % Swedish women of 19 years age group suffer from dysmenorroea. Sehgal, Marwah and Tiwari (1972) studied the prevalence of the discomfort among Indian women of the same age group, and observed that the prevalence of discomfort was 44.8 %. Vohra and Sen (1985) reported an investigation, conducted on healthy women, that 84 per cent among them suffer from pain and other troubles during menstruation. The differences among the percentage of prevalence of menstrual discomfort may be attributed to the differences in age, health, marital status and socio-economic status of the sample studied.

MENSTRUAL PATTERN

The three aspects of menstrual mechanism namely duration of menstrual bleeding, cycle length and feeling of menstrual discomfort can be termed as menstrual pattern. The menstrual pattern has been defined as "cyclic pattern of a women's menstrual duration, cycle length and prevalence of menstrual discomfort" (Khatoon, 1986).

Researches in India on menstrual pattern are few and far between. The term menstrual pattern has not been used by researchers, though isolated studies have been conducted by gynaecologists on individual aspect of menstrual patterns. Also no national level averages have been reported for menstrual cycle length, menstrual duration, and of feeling of discomfort. Khatoon (1986) determined the averages for the above mentioned aspects and they are reported below. But these averages were based on a small sample of women students of Aligarh Muslim University, Aligarh.

Pattern Aspect	Range	Average
Menstrual Cycle ...	21-33	28.70
Menstrual Duration ...	2-09	4.62
Menstrual Discomfort ...	0-03	1.76

These averages cannot be said to represent the national averages but at least broad inferences could be drawn. Thus there is a need for concerted effort to determine the national averages.

MENSTRUATION : SOCIO-PSYCHOLOGICAL ASPECTS

Menstruation as a physiological process has been discussed but the concomitant behavioural aspects have also to be highlighted. We remain, by and large, unaware of the physiological process and only respond to behavioural aspects.

It has been pointed out that external factors as well as personality factors influence almost all the aspects of menstruation -- menstrual cycle -- duration and feeling of discomfort (McClintock, 1971; Shanan, Brzezinski, Sulman and Sharon, 1965). Many external factors some times termed as environmental or situational factors, influence human behaviour in general and menstruation in particular. The response to menstruation is culturally conditioned. Scommega and Dmowski (1971) have dealt in detail with this aspect. They have shown that throughout the history bleeding was associated with violence, sickness and death. The concept of periodic loss of blood without visible harm to a woman was difficult to accept. Thus menstrual blood loss was viewed as an evil event and menstruation was considered as a morbid condition. They further comment that in most cultures during menstruation a woman was believed to be impure, unclean and various social restrictions were imposed upon her during this period to limit her contact with other member of society. Even today, menstruation is shrouded with misconceptions, doubts and taboos. In most Indian communities a menstruating woman is asked to sit apart and eat her meal separately. They may not be allowed to perform puja.

The feeling that the menstruating woman is dirty and unclean is widespread in Indian society. Bardwick (1971) contends that menstruating woman is considered as dirty and unclean. It may give rise to negative feelings and "the menstruating woman is likely to internalize it and also to resent it."

It is easy to infer that socio-cultural as well as environmental factors influence the menstrual patterns. Keeping this in mind we selected depression and anxiety and noise as the independent variables that may affect the menstrual pattern.

NOISE

Noise, temperature, illumination, etc., are the various extroceptive stimuli that influence human behaviour but noise has been recognised as the most significant determinant of behaviour of the modern technological era. There are toxic pollutants that are producing ecological imbalances but the noise pollution in cosmopolitan cities is a real threat to the quality of life. It has been found to be the worst form of environmental pollution. It is the principal killer, though its killing is slow and insidious (Latif, 1976).

Noise has been defined as the unwanted sound. Those sounds to which no definite pitch can be assigned are designated as noise. Its main characteristic is the great irregularity in vibration (Ahmad, 1977). It is usually unwanted, unpleasant irregular and intense. Blaring of loudspeakers, sound produced by trains, trucks, busses and automobiles may be cited as

examples. Added to these is the noise produced by supersonic jets which makes the city life unbearable to common people.

Effect of Noise : Mental and Physical

Shirreffs (1974) reported that modern civilisation imposes tremendous noise burdens on human hearing mechanism accelarating normal hearing loss. Pollock and Barltell (1932) pointed out that the effect of noise depends on the kind of noise and the kind of work. Mental work is effected more than manual work by noise. The effect of noise is greater when it is irregular and also when it is uninteresting. Laird and Coye (1929) reported that the noise that have a higher pitch are more annoying than those of lower pitch. The sound of either very high or very low tone qualities are more irritating than those of middle zone. Much earlier Morgan (1916) conducted a study in which he found that noise also causes muscle tension. Latif (1976) reported that people in noisy cities become victim of cardiovascular, respiratory and neurological diseases. Noise produces temporary constriction of the smaller arteries speeding up pulse and respiratory rates, while continuous exposure to loud noise results in dizziness, headache, fatigue, rise in blood pressure, and abnormal heart rhythm. Broadbent (1957) observed that the sudden and unexpected noise produced marked changes in the body, such as increased blood pressure, increased heart rate, and muscular contraction. The flow of saliva and gastric juices may be restricted. These changes wear off as a

person becomes accustomed to the noise. He further pointed out that even if a person is accustomed to an environment where the noise level is high, physiological changes occur. Smith and Laird (1930) studied the effect of noise on stomach contraction. They observed that marked gastric changes occur on exposure to sudden and unexpected noise even when the exposure to sudden and unexpected noise even when the exposure time was as short as 10 minutes. Shatalov (1962) found the differences in cardiovascular functions of textile workers exposed to 25-95 DB and those exposed to 114-120 DBs. The most significant difference found was a decrease in blood pressure and low heart rates during work. Ray, Brady and Emurian (1984) studied cardiovascular effects of noise during complex task performance. They draw a conclusion that the task performance was affected with significant increase in mean blood pressure, heart rate and respiration rate they also found the significant decrease in pulse rate. The noise exposure was found effecting further decrease in pulse rate and further increase in the average blood pressure.

The investigation on both animals and human subjects have revealed that noise can effect the hormonal level in the blood stream. Bugliarellow, Alexander, Barnes and Wakstein (1976) found that exposure to low frequency sound of 150 Hz, released oxytocin, the hormons that stimulate uterus during labour; noise-induced changes in oxytocine level may adversely affect

the foetus and birth process. The ill effects are reflected in the behaviour of the baby. They cry and are prone to gestrointestinal disorders.

Takahashi, Isao and Kyoshoki (1968) have reported a survey on influence of jet noise on the physiological growth of infants and school children living around air-fields. Results show a higher premature birth data, and slow growth rate of children. Cameron, Robertson and Zaks (1972) explored the urban parameters of noise and sound pollution. The result represented a possible association between sound exposure and increased prevalence of both acute and chronic illness.

In recent years experts in the field of psychology and gynaecology have forcefully advocated that noise may effect menstruation. The effect of auditory stimulation upon the reproductive organs and functions have also been studied by Zondek and Tamari (1976). They reported that the intense sound of 100 DB from an alarm bell does not affect the general behaviour of female rats and rabbits. Philipp Barne and Neuton (1970) suggested that the noise may effect the menstruation, fertility and pregnancy condition of the women working in noisy environment. Mehta, Mazumdar, Pathak and Skandhan (1977) made an attempt to study auditory reaction time (RT) during different phases of menstrual cycle. The result indicated that the RT was found on the peak on 15, 16, 17 and 18 day of the cycle. The increased hormonal level may be responsible for affecting the threshold of sensitivity.

ANXIETY AND DEPRESSION

Anxiety as an emotional response plays a major role in almost all the gynaecological problems, manifested both behaviourally and physiologically. Anxiety is experienced as a "foreboding dread or generalized anticipated fear or feeling of threat in apprehension" (Sharma, 1986). It is also defined in terms of perceived signal of danger which mobilizes the human organism's resources to counter the threat (Basowitz, Persky, Korchin and Grinker, 1955). It leads to disorganization and is observed as disterbances of human functioning. It is true that anxiety has many facets and may be expressed as feeling of vague, uneasiness, fear, anger, restlessness, irritability, etc. (Jersild, 1978). Anxiety may vary in degree and intensity ranging from mere nervousness to neurotic behaviour but its consequence may lead towards either neurosis or integrated healthy behaviour (Coleman, 1981; Basowitz and others, 1955). Freud (1936) while differentiating objectives and neurotic anxiety contends that the latter may have chronic manifestations due to repeated exposure to stressful situations. Anxiety in contemporary literature is classified in terms of "state anxiety" and "trait anxiety" (Cattel and Scheier, 1961). State anxiety is also called free-floating anxiety and is marked by changes in intensity and fluctuation. Trait anxiety is relatively stable and becomes an integral part of ones personality. It has been observed that those who have anxiety

as personality trait react in situations that contain some degree of stress. They perceive a wide range of objectively nondangerous circumstances as threatening, and respond to these situations with a state anxiety (Spielberger, 1966). Kaplan and Sadock (1981) categorize anxiety into four major types depending on the nature of feared consequences. These are super ego anxiety, castration anxiety, separation anxiety and impulse anxiety. They are of the opinion that "these varieties of anxiety are viewed as having their source and taking their colour from various points along continium of early growth and development". Shastri (1986) is of the view that the source of anxiety producing situations are increasing because of the demands of changing society marked by excessive competition, unemployment, adjustment problems in society as well as in the home.

DEPRESSION

Depression is used in many ways to describe a mood, a symptom, a syndrome as well as specific group of illness (Mendels, 1970). Arieti (1968) states that "depression" commonly refers to an aftermath of some negative emotional feelings. Some times it is viewed as symptoms and at other times it is considered as clinical entity. But since long it is contended that the essence is the persistent negative feeling which leads to "abnormal lack of feeling of pleasantness when compared with normal average" (Brown and Minningier, 1940). The feeling of

unpleasantness may often be accompanied by such somatic conditions as numbness, parasthesia of skin, alternation of muscle tone and decrease in despiration. There is also retardation of movement, rigidity in thinking and general feeling of weakness. Most of us particularly experience such feeling but this emotional state is most difficult to describe and to analyse. It is quite evident that depression seems to be reaction to psychological processes that have occurred at cognitive level.

The depressive mood when extending over a considerable period of time interferes with the daily activities of the individual. Lack of motivation to face the situation may lead to abnormal depression (Landis and Bolles, 1957). Depression is defined as "emotional state characterised by extreme dejection, gloomy rumination, feeling of worthlessness, loss of hope and often apprehension" (Coleman, 1981). Bakal (1979) reported that clinical depression is simply more intensive form of normal condition of feeling unhappy or down, and has also been reported to differ qualitatively from normal depression. It is interesting that in majority of the cases initially the symptoms are mild and disappear within a short time while in others, the symptoms are more persistent for which medical assistance is needed. Depressed people are classified on the basis of symptoms which includes sadness, pessimism and self dislike. It is also marked by lack of motivation and difficulty in concentration. Innumerable symptoms have been reported ranging from variation in mood to anxiety and a comprehensive list has been

compiled by Mendels (1970).

Psychologists classified depression into different categories, depending upon the intensity, duration, nature and origin of the symptoms. Brown and Menninger (1940) classified depression as mild depression, deep depression and suicidal depression. Coleman (1981) and other psychologists classify it as depressive neurosis and depressive psychosis. People suffering from depressive neurosis react to some distressing situation with more than the usual amount of sadness. The reaction may last for weeks or even months. And it is more frequent in women than men.

There is extensive evidence to indicate that many normal women suffering from depression display sharply decreased appetite, low self esteem and feeling of inferiority. Like minor emotional maladjustment, they represent ways of dealing with frustration and conflicts. The prevalence of clinical depression is at least twice as high in women than men (Paykal, 1976). Coleman (1981) has also reported that neurotic and psychotic depression was found to be more frequent among women. Psychologists (Stranger, 1976; Mendels, 1970) talk about the reactive depression. It is a reaction and not an illness, a response to condition of loss and disppointment. The response is highly subjective. The condition that may depress one individual may not effect the other. Some times the depression is internalized and manifested through the physical symptoms.

The problem is more frequent with menopausal women who complain of physical symptoms. Mendels is also of the view that "depressed women frequently report changes in their menstrual cycle. The most frequent problem is a lengthening of the usual cycle, with much lighter flow. Menstruation may stop completely for several months at a time". Extensive as well as intensive research work has been done to investigate the genesis, symptoms and ramification of anxiety and depression.

The two terms,anxiety and depression, often evoke a semblance of similarity because the symptoms of the two overlap (Clum, 1984). Generalized anxiety disorders are often accompanied by mild depression. They also occur without marked depressive symptoms. But experts (Derogatis, Kalarman and Lipman, 1970) have evolved strategies to differentiate between the two terms because they are definitely not synonymous. Differences could be found out with regard to the pattern, the level and the quality of symptoms. More precisely Derogatis, Lipman Cov and Rickels (1972) state that with regard to the level of symptoms, individuals with anxiety states typically score higher than individuals with depression on both the severity of fears and the number of phobic objects. They further point out that anxiety neurotics differ in their pattern of symptoms from depressive neurotics. The depressive neurotic does not have any interest in his environment and he may also have suicidal ideation. These two symptoms are not necessarily manifested by

anxiety neurotics. Clum (1984) suggested that "as similarities exist between anxiety and depression on the molar level, significant differences between them exist on a molecular level. The similarity of some features of anxiety reaction and depression does not mean that the two syndrome are in the same category". The overlapping as well as distinguishing features should be well understood, while examining the effect of these two personality variables.

ANXIETY AND DEPRESSION IN RELATION TO MENSTRUATION

Psychologists to the best of our knowledge have not tried to study the relationship between depression and anxiety and menstrual patterns. Naturally the cumulative effect of these two personality variables on menstrual patterns has also not been ascertained. Gynecologists and psychologists have visualised some relationship between anxiety, depression and other psychological variables and menstrual cycle phases and menstrual disorders. Parlee (1973) has reported an increase in tension, anxiety, depression, irritability, commission of violance, crime, suicide and accidents in the late or early menstrual days. He further says that negative behavioural aspects such as fatigue, lethargy, feeling of insecurity and heightened tension are commonly observed during premenstrual phase. May, Amherst and Amherst (1976) studied depressive mood shift and menstrual cycle among 30 healthy young women. The findings reveal that 50 % of

this group had their most depressive mood at premenstrual phase, while 40 % felt worst at menstrual phase and 10 % had low at mid cycle. Long back, Chadwick (1932) described the premenstrual phase as the "recurrent neuroses of women" and related anxiety and irritability to fear of bleeding which was symbolic of castration fear of early childhood.

Gottschalk, Kaplan, Gleser and Winget (1962) studied anxiety level of 5 women during their one-three menstrual cycle. The result suggested that 80 % of the subjects showed significantly rhythmic changes in the magnitude of anxiety, outward hostility, and/or inward hostility during the cycle. There was a tendency for the level of anxiety to decrease transiently around the time of ovulation followed by an increase of inward hostility during the cycle. There was a tendency for the level of anxiety to decrease transiently around the time of ovulation followed by an increase of inward hostility during the premenstrual phase. Dalton (1964) reported that there is gradual increase in the symptoms of depression, lethargy and irritability during pre-menstrual week but there is an abrupt cessation of symptoms at the onset of menstruation. She further reported that the environmental stresses such as death of the loved one, changing of job, ensuing marriage or divorce were found to have significant effect upon excerbation of symptoms.

Deutsch (1944) observed that there are individual variations

in occurrence of depression. She opined that some women suffer premenstruality while others during menstrual period. In describing premenstrual depression she stated that women who suffer from this condition have prepubertical expectations that something terrible is about to happen. Anxiety and depression were observed to be related to menstrual disorders. Much earlier O'Neill (1954) reported some cases of psychogenic bleeding, associated in seven cases with severe anxiety, in four cases with sexual conflict, in two cases with guilt and in the last case any emotional upset would cause bleeding. Friederich (1976) suggested that "stress also effects the production of neurotransmitters. Many kind of stress affect the reproductive physiology". Hill (1956) believes that fear and depression classically produce amenorrhea.

It is also important to note that if depression is profound enough a woman may not menstruate at all (Schildkraut, 1965). Sharman (1965) studied a group of 65 girls of the age group of 17-22 years, having signs of transient amenorrhea during their stay in the boarding school in Israel. The result indicated that 22 % of the sample was suffering from transient amenorrhea. The result also indicated that their TAT stories were significantly associated with positive ending and showed other indications of more latent anxiety than did the girls who did not suffer from transiant amenorrhea.

It could be easily inferred from the review of the research investigations that psychological factors do effect the

duration of menstrual bleeding and menstrual cycle length. Menstrual duration has been studied by Peskin (1968) in relation to tension and personality. Long duration was found to be related to personality integration. Laster and Orloff (1970) reported that the adolescent girls with shorter duration were more self-confident and dominant than girls with longer menstrual duration.

Gynaecologists (Schagl, Marwah and Tiwari (1972) forcefully advocate that psychological factors play a dominant role in dysmenorrhoea (pain during menses). Others (Israel, 1963; Fluhman, 1957) argues that psychological factors not only play causative role in dysmenorrhoea, rather they may be the end result as well. O'Neill (1954) endorses such a view and describes menstrual pain as a severe form of "masculine protest" found in women who may be inclined to reject the feminine role. Similarly Friederich(1976) views pain during menstrual phase as a psychic experience based on conscious or unconscious memories of guilt or it may be accentuated by a recent guilt provoking situation. In this regard it could be a psychosomatic symptom akin to conversion reaction symbolizing forbidden psychological wishes or fantasies. We get ample support from Paulson's (1966) findings that the factors contributing to dysmenorrhoea may be traced to life experiences and negative attitudes towards feminity.

AIMS OF THE STUDY

When we venture to critically evaluate the literature discussed earlier a few facts clearly emerge. Gyneacologists while explaining certain unexplained phenomena attribute the suffering to psychological factors. Their meaning and concept of psychological factors remain ill-defined. It is also customary on their part to club together a host of factors. The terms anxiety and depression are usually differentiated simply on the basis of symptoms. Though extensive overlaps have been reported, these symptoms are not ascertained with the help of truly valid and reliable psychological tools.

Psychologists have not addressed themselves to study the menstrual patterns. They uncritically accept the findings of gyneacologists who have mainly investigated the people suffering from menstrual disorders. In brief, studies on normal and healthy women have not been conducted.

It is desirable that each aspect of menstrual pattern -- cycle, duration and feeling of discomfort -- should be thoroughly investigated. Then the influence of anxiety and depression on these aspects have to be ascertained. Noise pollution is threatening the quality of human life. Research reports reveal that it has contributed to maladjustments and abnormality in big cosmopolitan cities. It is logical that the influence of extroceptive stimulus (noise) on menstrual patterns should be probed into so as to facilitate the adjustment of working women

in particular and the women folk in general.

Menarche, the first menstrual bleeding has been reported to be significant event throughout the reproductive years of women. This aspect has so far eluded the attention of psychologists. Its relation to anxiety, depression and noise must be determined.

Innovative methodological approach had to be developed for the measurement of each aspect of menstrual pattern. This has led to the development of a standardized tool (Menstrual Pattern Schedule). This tool may prove helpful to psychologists who intend to further extend such a study or who desire to measure the menstrual pattern in future.

The study is expected to throw light on many other aspects of menstruation which have not been properly understood.

CHAPTER II

METHODOLOGY

The spirit of scientific enquiry is to objectively ascertain facts and analyse them in an unbiased manner to draw fruitful conclusions. Scientific methodology was evolved to achieve these objectives and psychology, in accordance with this spirit disowned a long time ago all those methods which, despite providing useful data were intrinsically subjective. The choice of a method is governed by the type of the problem the researcher intends to investigate. Exploratory studies are conducted when the researcher finds that there exists little or vague knowledge about a problem. In such a case it is also difficult to postulate explicit hypotheses. Confirmatory experiments could only be conducted when the researcher has information related to the problem on a host of variables (Elmes, Kantowitz and Roediger, 1985). This together with the development of insight into problems is extremely helpful in explicitly formulating the hypothesis. The exploratory method also helps in the determining the independent variable whereas in the confirmatory experiment we determine the extent to which the independent variable influences the dependent one.

The above mentioned aspects were discussed in detail because they are directly related to our present investigation.

The relationship between noise and menstrual pattern has not been investigated yet. In this regard we have to follow the exploratory method together with relevant information about the influence of noise on menstrual cycle length, menstrual duration and feeling of discomfort. As regards the two other independent variables -- anxiety and depression -- much information is available, so it could conform to the requirements of confirmatory experimentation. When independent variables are properly delineated and their levels categorized it is possible to test the influence of independent variables on the dependent ones. Such experimental designs are known as factorial designs. "Factorial experiments include conditions that represents all possible combinations of all levels of each independent variable" (Elmes, Kantowitz and Roediger 1985). In factorial design the main effects of each independent variable are separately determined. It could also be found out how the variables affect and influence each other. Technically it is known as 'interaction effect'. The present investigation seems appropriately amenable to factorial design.

The review of research literature, reported in the preceding chapter, clearly brings to the fore that noise, anxiety and depression may influence menstrual pattern. It was observed that very few researchers have attempted to relate the influence of noise on menstrual cycle, duration and feeling of discomfort. The foremost concern of the researcher was to ascertain the influence of noise on the above mentioned

menstrual aspects. Thus it was imperative that an experiment be conducted to determine the influence of the independent variable (noise) on the dependent variable (menstrual pattern).

EXPERIMENT ON NOISE

An exploratory study was conducted to determine the influence of noise on three aspects of menstrual pattern. For this purpose the resident students of Sarojini Naidu Hall, Aligarh Muslim University, Aligarh, were selected. This Hall of residence is meant for post-graduate, medical and engineering women students. Research scholars also reside there. The main consideration was that the resident members of S.N. Hall being mature would cooperate enthusiastically in the conduct of the investigation.

From the list of bona fide residents of S.N. Hall 30 students were randomly selected. Each of them were individually administered the Menstrual Pattern Schedule (MPS) developed by the investigator. This was done much before conducting the experiment. Each individual's data for cycle length, menstrual duration and feeling of discomfort was obtained. After a lapse of about four months the purpose of the investigation was explained to the subjects regarding their exposure to noise for a period of 30 minutes. The experiment was to be conducted in each subject's room to control such extraneous variables as newness of locale, inadevertent disruption by visitors of the

experimental procedure, etc. In spite of personal rapport and persuasion, only 16 subjects volunteered to participate in the experiment, and completed the experimental procedures. The age of the subjects ranged between 19-24 and the family income ranged between Rs. 2,100 to 3,000 p.m.

The duration of the exposure time may be debatable but ethical considerations influenced our choice regarding duration and intensity of noise. Some of the subjects were initially exposed to a duration of an hour but they protested that they could not bear the long exposure. This led the investigator to reduce the exposure time to 30 minutes. As regards the noise intensity, it was recorded from various places such as railway platform, industrial organisations, etc. The main concern was that high intensity noise was to be recorded. The taped noise was measured in terms of DB, the prescribed unit of noise. The average value of noise power was found to be equivalent to 79 DB.

Each subject's expected date of menstruation was obtained from the persons selected. They were exposed to the noise experiment for 30 minutes, 2-5 days prior to the menstrual period. During the experimentation the subjects were engaged in cancellation of vowels taken from newspapers. Care was taken to ensure that each subject was given a passage of equal length. The MPS was readministered to the same subjects after their menstrual phase. The subjects were also requested to give

informations about their experience of exposure to noise.

It was hypothesised that exposure to noise would influence menstrual pattern. More precisely, it would affect menstrual cycle length, duration and feeling of discomfort during menstruation. The experimental procedure detailed above would reveal that it was a before and after design.

It is quite apparent that noise was considered as an independent variable and the three aspects of menstrual patterns were the dependent ones.

Kolmogrov-Smirnov (K-S) test was used to measure significant differences between the groups. The minimal requirement for K-S two-sample test is an ordinal scaling of measurement and it determines the significant difference between the two independent samples drawn from the same population. "The two-tailed test is sensitive to any kind of difference in the distributions from which the two samples were drawn -- differences in location (central tendency), in dispersion, in skewness, etc." When compared with t-test it has power efficiency of about 96 per cent for small samples. The differences in menstrual pattern scores between before and after exposure to noise were tested and the results obtained are given in tables 1 2 and 3.

It is clearly perceptible that noise does not influence menstrual cycle length, menstrual duration and feeling of discomfort. It could be inferred that noise cannot be taken

Table 1

NOISE AND MENSTRUAL CYCLE

Noise	K-S value	Remarks
Before Exposure After Exposure	1.15	Insignificant

Table 2

NOISE AND MENSTRUAL DURATION

Noise	K-S value	Remarks
Before Exposure After Exposure	1.03	Insignificant

Table 3

NOISE AND MENSTRUAL DISCOMFORT

Noise	K-S value	Remarks
Before Exposure After Exposure	2.00	Insignificant

as an independent variable to study menstrual pattern. But a few considerations have to be taken into account before we can pass a categorical judgement. Firstly, the sample size was small. Secondly, the exposure time was short and thirdly we were not in a position to conduct the experiment repeatedly on the subjects who had volunteered to participate. Apart from these methodological aspects we should not ignore the physiological aspects of the mechanism of menstruation. It is reported that ovulation takes place on the 14th day before the onset of next cycle. Thus, the cycle may be influenced by extroceptive stimulus (noise) on the day mentioned above, though the duration and feeling of discomfort may remain largely unaffected. Thus a complicated and comprehensive experimentation spread over a period of at least six months is required to study the influence of noise on menstrual pattern. The limitations mentioned above did not allow us freedom for continuation of the experimentation.

Review of literature undertaken in the preceding chapter impresses us with the fact that age of the subject and the time/age at which menstruation occurs are the other variables that may influence menstrual cycle, duration and feeling of discomfort. It was observed that the regularity-irregularity (menstruation) syndrome may also influence menstrual pattern. It is proposed to investigate the influence of these variables in conjunction with anxiety and depression. Summarising the variables proposed to be investigated we may delineate them as given below:

Independent Variables

Anxiety, depression, age of menarche, age of subject and irregularity of occurrence of menstruation.

Dependent Variables

Menstrual cycle length, menstrual duration and feeling of menstrual discomfort.

Tools Used

The measuring tools have to be discussed so as to make our choice of research design and statistical analysis. Manifest anxiety of the subjects was measured with the help of a scale developed by Khan and Hasan (1978). As a matter of fact, it is a shorter version of Sinha's Anxiety Scale. It consists of 30 items and the norms have been provided by the authors for female as well as male students. The normative sample was of Aligarh Muslim University, Aligarh. The split-half reliability of this scale was found to be 0.72. The validity of this test was determined by correlating the scores of the subjects on Maslow's Security Insecurity Inventory (1952) and Cattell's Scale of Ergic Tension included in his 16 PF Questionnaire (1965). The correlation coefficients of the shorter Scale with Maslow's S-I Inventory and Cattell's Scale of Tension were 0.535 and 0.531 respectively (Khan and Hasan, 1978).

Depression was measured with the help of Murthy's D-Scale. It is one of the nine scales of Multiphasic Questionnaire

developed by Murthy (1965) which measures the depression. The D-Scale consists of 14 items. The split half reliability of this scale was 0.70.

The three aspects of menstrual pattern (the cycle length, menstrual duration and feeling of menstrual discomfort) were measured with the help of Menstrual Pattern Schedule (MPS) developed by the investigator (Khatoon, 1986) (Appendix I). The procedure adopted to develop the Schedule as a valid and reliable measure has been extensively discussed.

SAMPLE

Muslim University, Aligarh, is one of the oldest residential universities of the country. The bona fide students are alotted to various Halls of Residence. Sarojini Naidu Hall (S.N.) and Abdullah Hall (A.H.) are exclusively meant for the women students of the University. Postgraduate (Law, Teacher Trainees, Library Science, etc.) Research Scholars, Engineering and Medical and such other students enrolled for professional courses reside in S.N. Hall whereas all the undergraduate students are the members of Abdullah Hall. Also post-graduates of Arts, Science and Commerce are admitted to Abdullah Hall.

A complete list of students of each Hall was obtained from the Provost Offices. Every fourth individual was randomly selected. In case of non-availability of a particular individual, the next one on the list was included. The sample

comprised of 75 (N = 300) students of S.N. Hall, and 200 (N = 800) students of Abdullah Hall.

Table 4 given below represents the essential features of the sample.

TABLE 4

Variable	Range	Mean
Age of subjects	17-25	21.26
Parental income	Rs. 600-4,000	2,312
Educational level (Parental)	High School Ph.D.	

It may be observed that the age of the subjects ranges between 17-25 years with a mean of 21.26. The subjects are post-adolescents and young adults. The income range is widespread, but, the mean = 2,312 which is indicative of the fact that the majority comes from upper middle income group. The parental educational level of the sample ranges between High School to Ph.D.

DATA COLLECTION

The collection of data was divided into various phases because of the nature of the investigation. Few people give frank responses to personal questions and specially to the aspects which are considered to be social taboos. It is an

undeniable fact that in our society people would not like to talk about sex. Similarly, information about menstruation had to be obtained in strict confidence. This required special measures to win over the subjects, develop mutual confidence and motivate them to elicit precise information. These considerations led us to decide to first of all collect data on menstrual pattern with the help of MPS.

Preliminary contact was established with a few enlightened subjects and the aims and objectives of the study regarding information about menstruation was explained to them. They were assured that their identities would not be revealed to any one and their responses would be treated in strict confidence. Initially we discussed the problem of menstruation. Many subjects sought information from the investigator about certain aspects of menstruations. Having won the confidence of the group, the investigator individually approached the randomly selected subjects. The names of those were deleted who were not found very willing to participate in the investigation. The next individual was approached and the same procedure was adopted for each subject.

Having established rapport, prior appointment with each subject was sought and time, date and place were fixed. The MPS was untimed and since many clarifications regarding terminology used were solicited by the subjects long, often repeated sittings were required for each administration. Care

was taken that except for the investigator no one was present in the room during data collection. Undoubtedly it was a time consuming process but it was adhered to ensure the reliability of data.

Then anxiety and depression scales were administered to the same subjects in more or less the same manner. The responses were tabulated on a master sheet and tables were made separately for analysis in accordance with requirements of various statistical tests.

The next phase pertained to the determination of influence of noise on menstrual pattern. We have already reported the experiment.

EXPERIMENTAL DESIGN

As stated earlier, we had four independent and three dependent variables to manipulate to achieve the objectives of the study. In such cases usually multivariate analysis are considered most appropriate. The investigator faced two important difficulties. Firstly, the determination of composite scores of each individual for menstrual cycle, duration and discomfort. Secondly, the computational hazards of operating all the variables together. Most precisely, the non-availability of computer programme for the multivariated analysis posed the greatest impediment for such an analysis. These led to the decision to use univariate analysis

where the influence of a group of independent variables could be studied on each aspect of menstrual pattern.

McGuigan (1969) states that "one possible design for studying two or more independent variables in a single experiment is the factorial design. A complete factorial design is one where all possible combinations of the selected values of each of the independent variables are used".

Each independent variable was dichotomised and 2 x 2 design and 2 x 2 x 2 designs was used. Analysis of variance was used for determining the significant differences and where the results were found to be significant t-test was used.

The simplest application of F-test indicates an estimate of error variance plus an estimate of the real effect (if any) of the independent variable (McGuigan, 1969). In order to determine the F-ratio the independent variables were dichotomised. F-ratio for each aspect of menstrual pattern was separately determined. t-test, a powerful parametric test, was used to analyse the significant differences between the means. It is a useful statistical test when small groups having similar variability are to be compared (Tate, 1956).

The first F-test pertained to the determination of influence of Anxiety (A), Depression (B) and interaction (AxB) effect of the independent variables on each aspect of the menstrual patterns. This constituted the 2 x 2 design. In case of 2 x 2 x 2 designs, three independent variables were

similarly treated. Broad hypotheses were framed and tested as given below:

(1) Anxiety and Depression would influence menstrual cycle length, duration and feeling of discomfort.

(2) The interaction of the independent variables would significantly influence each of the dependent variables.

(3) Anxiety, depression and age of menarche would influence menstrual cycle length, duration and feeling of discomfort.

(4) The interaction of the independent variables would significantly influence each of the dependent variables.

(5) Anxiety, depression and age of the subject would influence menstrual cycle length, duration and feeling of discomfort.

(6) The interaction of the independent variables would significantly influence each of the dependent variables.

(7) Anxiety, depression and irregularity would influence menstrual cycle length, duration and feeling of discomfort.

(8) The interaction of the independent variables would significantly influence each of the dependent variables.

CHAPTER III

RESULTS AND DISCUSSION

The ultimate objective of any research investigation is to draw unbiased inference and to meaningfully interpret the results obtained. In the preceding chapter, we dwelt upon the theoretical issues and highlighted the objectives of the present study. Then the essential steps involved in carrying out the research were discussed and the hypotheses to be tested were broadly stated. Having crossed the mid-stream, we now set sail to present the results obtained through statistical analysis to be followed by the interpretations and implications of the findings.

The first analysis undertaken was aimed at determining the influence of anxiety and depression on Menstrual Cycle Length (MCL). More precisely, it was meant to answer the following questions:

(1) Does Anxiety (A) influence MCL?

(2) Does Depression (B) influence MCL?

(3) Does the interaction (A x B) between the independent variables influence MCL?

The results of ANOVA are reported in Table 5.

TABLE 5

Influence of Anxiety and Depression on Menstrual Cycle Length

ANOVA

Source of variation	Sum of square	df	Mean square	F
Between Anxiety (A)	2.4	1	2.4	0.37
Between Depression (B)	21.6	1	21.6	3.36
Intraction (A x B)	15.0	1	15.0	2.33
Within SS (error)	360.0	56	6.42	
TOTAL	399.0	59		

The computed values of F were found to be statistically insignificant which led the investigator to conclude that neither Anxiety nor Depression influence menstrual cycle length. The interaction effects were also found to be insignificant. The purpose of the next analysis was to ascertain the influence of Anxiety and Depression on Menstrual Duration (MD).

The results are reported in Table 6.

TABLE 6

Influence of Anxiety and Depression on Menstrual Duration

ANOVA

Source of variation	Sum of square	df	Mean square	F
Between Anxiety (A)	0.59	1	0.59	0.34
Between Depression (B)	24.05	1	24.05	13.98*
Interaction (A x B)	16.03	1	16.03	9.31*
Within SS (error)	96.58	56	1.72	
TOTAL	137.25	59		

* Significant at .01 level.

It is clearly perceptible that Anxiety does not influence menstrual duration, but Depression alone as well as in conjunction with Anxiety influences MD. The results of t-test are reported in Table 7. High depression group significantly differs with low depression group with respect to average menstrual duration. The former group has shorter duration than the later one. It could be tentatively inferred that depression may be responsible for shortening of menstrual duration.

TABLE 7

Depression and Menstrual Duration

Groups compared	Mean duration in days	t-value
Depression high	3.63	7.09*
Depression low	4.90	

* Significant at .01 level.

TABLE 8

Interaction Effect (AxB) on Menstrual Duration

Groups compared	Mean duration in days	t-value
A(h) + D(h)	4.23	1.07
A(h) + D(l)	4.49	
A(h) + D(h)	4.23	4.84*
A(l) + D(h)	3.00	
A(h) + D(h)	4.23	4.62*
A(l) + D(l)	5.30	
A(h) + D(l)	4.49	4.33*
A(l) + D(h)	3.00	
A(h) + D(l)	4.49	2.78
A(l) + D(l)	5.30	
A(l) + D(h)	3.00	7.44*
A(l) + D(l)	5.30	

* Significant at .01 level.

The influence of Anxiety and Depression on the feeling of menstrual discomfort has been reported in Table 9. Once again Depression has emerged as the variable which influences the feeling of menstrual discomfort. Also the interaction effects were found to be significant.

Table 9

Influence of Anxiety and Depression on Menstrual Discomfort

ANOVA

Source of variation	Sum of square	df	Mean square	F
Between Anxiety (A)	2.40	1	2.40	3.75
Between Depression (B)	26.66	1	26.66	41.65*
Interaction (A x B)	4.26	1	4.26	6.65**
Within SS (Error)	36.28	56	00.64	

* Significant at .01 level.
** Significant at .05 level.

t-analysis reported in Table 10 reveals that high depression group has greater feeling of discomfort than the low depression group. Thus depression influences the feeling of discomfort.

Table 10

Depression and Menstrual Discomfot

Groups compared	Mean (Discomfort)	t-value
Depression High	2.46	4.70*
Depression Low	1.13	

* Significant at .01 level.

As regards the interaction effects again it is observed that high depression by itself as well as in combination with high anxiety accentuates the feeling of menstrual discomfort.

It could be summarized that depression influences menstrual duration and feeling of discomfort.

Table 11

Interaction Effect of (AxB) on Menstrual discomfort

Groups compared	Mean (Discomfort)	t-value
A(h) + D(h)	2.93	3.52*
A(h) + D(l)	1.06	
A(h) + D(h)	2.93	1.83
A(l) + D(h)	2.00	
A(h) + D(h)	2.93	3.45*
A(l) + D(l)	1.20	
A(h) + D(l)	1.06	2.48*
A(l) + D(h)	2.00	
A(h) + D(l)	1.06	0.37
A(l) + D(l)	1.20	
A(l) + D(h)	2.00	2.18**
A(l) + D(l)	1.20	

* Significant at .01 level.
** Significant at .05 level.

Review of literature has impressed us with the fact that the menstrual pattern may be influenced by the age of menarche of the subject. Thus the influence of this independent variable was also assessed. To be more precise, we considered three independent variables (menarche, anxiety and depression) and determined their influence on each aspect of menstrual pattern-cycle length, duration and feeling of discomfort. The analysis reported below deals with the above mentioned aspects.

Table 12

Influence of Anxiety, Depression and Age of Menarche on Menstrual Cycle Length

ANOVA

Source of Variation	Sum of square	df	Mean square	F
Between Anxiety (A)	13.56	1	13.56	2.12
Between Depression (B)	0.45	1	0.45	0.07
Between Menarche (C)	0.07	1	0.07	0.01
Interaction (A x B)	0.09	1	0.09	0.01
Interaction (A x C)	1.50	1	1.50	0.24
Interaction (B x C)	6.00	1	6.00	0.94
Interaction (A x B x C)	21.67	1	21.67	3.40
Within SS (error)	581.00	88	6.37	
TOTAL	6,027.00	95		

The calculated values of F were found to be statistically insignificant. It can be concluded that none of the variables (anxiety, depression, age of menarche) influences menstrual cycle length. The interaction effects were also found to be insignificant. Earlier, also similar findings of MCL have been obtained.

TABLE 13

Influence of Anxiety, Depression and Age of Menarche on Menstrual Duration

ANOVA

Source of variation	Sum of square	df	Mean square	F
Between Anxiety (A)	3.37	1	3.37	1.68
Between Depression (B)	40.04	1	40.04	20.02*
Between Menarche (C)	3.37	1	3.37	1.68
Interaction (A x B)	22.04	1	22.04	11.02*
Interaction (A x C)	7.04	1	7.04	3.52
Interaction (B x C)	0.37	1	0.37	0.18
Interaction (A x B x C)	0.38	1	0.38	0.19
Within SS (error)	176.35	88	2.00	
TOTAL	252.96	95		

* Significant at .01 level.

It is observed that Anxiety (A) and age of Menarche (C) do not influence menstrual duration. Depression, here again was found influencing menstrual duration.The obtained F value is 20.02 which is significant at .01 level. The interaction effect of anxiety and depression was also found to be significant. It is obvious that depression by itself as well as when combined with anxiety tends to influence menstrual duration. The results of t-test are reported in the following tables.

TABLE 14

Depression and Menstrual Duration

Group compared	Mean (Duration in days)	t-value
Depression High	4.25	9.67*
Depression Low	5.54	

* Significant at .01 level.

High depression group yielded shorter average duration than the low depression group.

The t-analysis reported in Table 14 reveals that high depression group significantly differs with low depression group with respect to average menstrual duration.

TABLE - 15

Inreraction Effect A x B on Menstrual Duration

Groups compared	Mean (Duration in days)	t-value
A(h)+ D(h) A(h) + D(l)	4.91 5.25	1.86
A(h) + D(h) A(l) + D(h)	4.91 3.58	7.36*
A(h) + D(h) A(l) + D(l)	4.91 5.83	5.02*
A(h) + D(l) A(l) + D(h)	5.25 3.58	7.74*
A(h) + D(l) A(l) + D(l)	5.25 5.83	2.65**
A(l) + D(h) A(l) + D(l)	3.58 5.83	10.36*

* Significant at .01 level.
** Significant at .05 level.

It could be easily construed that high depression in roaring majority of the cases leads to shorter duration irrespective of its combination with high or low anxiety. This further lends support to our later findings and the role played by depression on menstrual duration is highlighted.

TABLE 16

Influence of Anxiety, Depression and Age of Menarche on Menstrual Discomfort

ANOVA

Source of variation	Sum of square	df	Mean square	F
Between Anxiety (A)	0.04	1	0.04	0.05
Between Depression (B)	26.04	1	26.04	33.38*
Between Menarche (C)	0.17	1	0.17	0.21
Interaction (A x B)	0.16	1	0.16	0.20
Interaction (A x C)	1.04	1	1.04	1.33
Interaction (B x C)	0.37	1	0.37	0.47
Interaction (A x B x C)	0.67	1	0.67	0.85
Within SS (error)	69.35	88	0.78	
Total	97.84	95		

* Significant at .01 level.

Only depression was found to influence the feeling of menstrual discomfort. All the interaction effects were insignificant like the other two independent variables (Anxiety and Age of Menarche). The influence of depression on the feeling of menstrual discomfort has been analysed by t-test. The result clearly indicate that the high depression group has greater feeling of discomfort than the low depression group. The result is reported in Table 17.

TABLE 17

Depression and Menstrual Discomfort

Groups compared	Mean (Discomfort)	t-value
Depression High	2.47	4.52*
Depression Low	1.43	

* Significant at .01 level.

The effect of anxiety and depression in conjunction with age of the subjects on the three aspects of menstrual pattern were also determined. The results are reported in the following tables.

TABLE 18

Influence of Anxiety, Depression and Age of the Subjects on Menstrual Cycle Length

ANOVA

Source of variation	Sum of square	df	Mean square	F
Between Anxiety (A)	3.28	1	3.28	0.43
Between Depression (B)	1.38	1	1.38	0.18
Between Age (C)	10.92	1	10.92	1.45
Interaction (A x B)	0.01	1	0.01	0.01
Interaction (A x C)	19.10	1	19.10	2.54
Interaction (B x C)	1.92	1	1.92	0.25
Interaction (A x B x C)	13.91	1	13.91	1.85
Within SS (error)	601.10	80	7.51	
Total	651.62	87		

None of the independent variables were observed to influence the menstrual cycle length. The same was true to the interaction

effects. The results are in conformity with earlier findings.

TABLE 19

Influence of Anxiety, Depression and Age of Subject on Menstrual Duration

ANOVA

Source of variation	Sum of square	df	Mean square	F
Between Anxiety (A)	0.41	1	0.41	0.23
Between Depression (B)	13.13	1	13.13	7.54*
Between Age (C)	3.41	1	3.41	1.95
Interaction (A x B)	1.13	1	1.13	0.68
Interaction (A x C)	0.04	1	0.04	0.02
Interaction (B x C)	13.13	1	13.13	7.54*
Interaction (A x B x C)	1.05	1	1.05	0.60
Within SS (error)	139.66	80	1.74	
Total	171.96	87		

* Significant at .01 level.

It is apparent that Anxiety does not influence menstrual duration. The computed value of F of Age of the subject was also found statistically insignificant which led to the conclusion that age by itself does not influence menstrual duration. But depression by itself and in conjunction with age of the subject influences menstrual duration. The result obtained through t-test is reported in the following tables.

TABLE 20

Depression and Menstrual Duration

Groups compared	Mean (Duration)	t-value
Depression High	4.09	5.19*
Depression Low	4.86	

* Significant at .01 level.

It has been earlier verified that high depression may be responsible for shortening of menstrual period and a similar trend emerges when it is combined with higher age of the subject. The cut-out points for lower and higher age groups were the value of Q_1 and Q_3 respectively, computed for the sample. The interaction effects depression x age (B x C) was further analysed through t-test. The results are reported in table 21.

TABLE 21

Interaction Effect of (BxC) on Menstrual Duration

Groups compared	Mean (Duration in days)	t-value
D(h) + Age(h)	3.5	5.98*
D(h) + Age(l)	4.68	
D(h) + Age(h)	3.50	7.15*
D(l) + Age(h)	5.04	
D(h) + Age(h)	3.50	5.05*
D(l) + Age(l)	4.68	

D(h) + Age(l) D(l) + Age(h)	4.68 5.04	1.77
D(l) + Age(h) D(l) + Age(l)	5.04 4.68	1.47

* Significant at .01 level.

The table 21 indicates that wherever t-values were found to be statistically significant, high depression with high age yielded lower averages of menstrual duration. More precisely, high depression by itself and when combined with higher age was responsible for shortening of menstrual duration.

TABLE 22

Influence of Anxiety, Depression and Age of Subjects on Menstrual Discomfort

ANOVA

Source of variation	Sum of square	df	Mean square	F
Between Anxiety (A)	0.10	1	0.10	0.28
Between Depression (B)	14.17	1	14.17	40.48*
Between Age (C)	0.01	1	0.01	0.02
Interaction (A x B)	1.37	1	1.37	3.91
Interaction (A x C)	0.10	1	0.10	0.28
Interaction (B x C)	0.55	1	0.55	1.57
Interaction (A x B x C)	0.08	1	0.08	0.22
Within SS (error)	28.22	80	0.35	
Total	44.45	87		

* Significant at .01 level.

All the computed values of F were found to be statistically insignificant except that of depression, which was found to be significant at .01 level. The difference between the depression groups were further analysed by t_test. The result is reported in the table given below:

TABLE 23

Depression and Menstrual Discomfort

Groups compared	Mean (Discomfort)	t-value
Depression High	2.47	2.33**
Depression Low	1.68	

** Significant at .05 level.

The result clearly indicates that high depression may lead to greater menstrual discomfort.

Women having irregular menstruation have been reported to have many psychological problems. The investigator made an attempt to ascertain the influence of Anxiety, Depression and Irregularity on various facets of menstrual patterns. But unfortunately the number of women reporting menstrual irregularity was inadequate. The analyses revealed that irregularity did not influence cycle length, duration as well as the feeling of discomfort. Interaction affects were also found to be insignificant (Appendix XIV).

INTERPRETATION

The analyses reported earlier indicate a trend that cycle length is not influenced by various permutations and combinations of the independent variables considered so far. This finding could be interpreted in terms of the specific meaning attached to the menstrual cycle length. It is purely a gynaecological term which states that, on an average, the ovum is released on the 14th day before the onset of the next menstrual period. It ranges between 21-34 days and it has a mean of 28 $\pm$ 2 days (Schoeneck, 1957; Hawkins and Bourne, 1971; Israel, 1976). It is pertinent to note that during the data collection most of the subjects sought clarification from the investigator about the concept of cycle length. It is indicative of lack of information about the menstrual cycle length. This is true about most of the women.

The onset of menstruation is a physiological process which is experienced by each adult woman till the age of menopause. So its onset can be precisely known. But the physiological process of ovulution which takes place every month except during pregnancy, lactation, pre-menopausal phase or due to certain disorders, is totally internal and never perceptible among normal women. The physiological process which could not be observed, perceived or experienced could hardly evoke a response. For, it may be rationally and logically construed that a process which does not surface to the level of awareness, can naturally not be amenable to proper evaluation, neither can precise information with regard

to it be furnished. Probably, these significant psychological aspects might have influenced the report of the subjects. There is another important dimension which we can hardly afford to overlook. Women, by and large, are not imparted sex education and any discussion pertaining to sex is still considered a taboo. Experience shows that relevant information related to menstruation is not given to the adolescent girls. Whatever they learn, they learn by trial and error or by sharing personal experiences with their companions. Naturally, they cannot discuss the process (menstrual cycle length) which has never been experienced by them. In such a case even the source of trial and error to obtain information has to be totally discounted. Thus, it may be argued that lack of awareness about the menstrual cycle length and the remote, almost impossible, possibility of ever experiencing the process of ovulution might have been responsible for determining the trend of the results.

Probably, the present venture by a psychologist was the first of its kind due to which we cannot cite relevant studies in support of our results. The studies reviewed in the earlier chapter were undertaken by gynaecologists and they too largely confined themselves to the subjects suffering from certain disorders.

Anxiety has been the other independent variable which was investigated to find out its influence on menstrual

duration and discomfort. It was revealed that the above mentioned aspects of menstrual pattern were not influenced by anxiety. But, it has been observed that interaction effects of anxiety and depression influenced both duration and discomfort. Thus, anxiety when combined with depression assumes potentiality to cast its influence on menstrual duration and discomfort.

It is interesting that anxiety has been extensively studied by gynaecologists (Lahmer, Miller and Deleon-Jones, 1982; Golub, 1976; Englander-Golden, Willis and Dienstbier, 1977). They were basically concerned with studying the relationship between menstrual phases and anxiety. Also their subjects were the people suffering from one or the other type of gynaecological disorders. Normal young women have not been studied to determine the influence of anxiety on menstrual duration and feeling of discomfort. Recently, a national level U.G.C. Seminar was organised on anxiety by the Department of Psychology, Banaras Hindu University, Varanasi, during the month of November, 1986, where scores of papers were presented on problems related to methodology, measurement of anxiety, its nature and kind, and the extent of anxiety present among adults, during pregnancy and among married and unmarried teachers. But, unfortunately, no research paper related to the present investigation was presented. The only published work that we come across among Indian psychologists is that of Thomas and Kaliappan (1985), who have shown that menstrual

distress and anxiety could be reduced through relaxation therepy. The finding is significant in itself as far as the implications of the present investigation is concerned.

It is important to note that social interactions are believed to be the important aspects for the emergence of anxiety situation (Leonard, 1950). It is also true as Shastri (1986) points out that anxiety is a multifaceted concept having cognitive, affective, physiological and behavioural manifestations emanating from encounters across diverse settings and encompassing personal as well as social domain of one's existence. The experience of anxiety is subjectively defined by the individual. Thus, before interpreting the results of the present study we have to take into consideration the sample characteristics, the socio-cultural milieu of the campus and such other demographic variables. As already reported, the subjects came from good socio-economic background, were relatively young and were pursuing courses of study with hopes and aspirations of a reasonably bright future. The students generally freely interact with each other and are allowed opportunity to participate in academic and co-curricular activities. It may be visualised that such aspects of residential life might have minimised the possibility of anxiety getting a hold over the subjects. The boon of such a residential life may not percolate to a few unfortunate ones but such people would be in a very insignificant minority. It seems that

relatively easier competition, better socio-economic background and relative absence of stressful situation (low level of anxiety) might have been responsible for showing insignificant influence of anxiety on duration and discomfort.

Depression during the course of the investigation, emerged as the most important variable that influences menstrual duration and discomfort. Consistently it was revealed that depression leads to shortening of menstrual duration and greater feeling of discomfort during the periods. Such results have not been reported in the literature as yet whether in India or outside. It also come to light that depression when combined with other independent variables depicted a similar trend both for duration and feeling of discomfort.

Mendels (1970) observed that depressed women may completely stop menstruating for several months. Such a case seems to be related to acute form of depression bordening on serious personality complications. Such cases are reported about patients suffering from serious gynaecological disorders involving serious emotional strains, malnutrition or mal-functioning of endocrines (Merchant, 1969). Shorter menstrual duration has also been associated with shocking experiences of menarche and it is termed as functional inhibition (Pasnau, 1969).

Dysmenorrhoea, acute pain during menstrual period, is significantly correlated with menstrual irritability, headache, depression, etc. (Kessel and Coppen,1963). Menstrual discomfort

in the absence of definite physical pathology is often associated with psychosomatic disturbances (Pasnau, 1969). Magni (1984) suggests that various cases of ideopathic pelvic pain is directly related to manifest depression. In the light of the above research findings it can be said that menstrual disturbances are related to depression. In other words depression influences both the menstrual duration as well as the feeling of pain, but no research has categorically pointed out that depression may lead to reduction in the number of days of menstrual period. The present finding is significant in many ways. The reduced rate of duration may generate the feeling in the individual that something is gynaecologically wrong with the individual specially if one would not know that the shortening of duration was due to depression suffered by the individual.

This may pose serious problems for the employed women, students as well as the housewives. In order to help women in their adjustment to various facets of life they should be trained to offset the mal-effects of depression. Probably, the relaxation therapy demonstrated to be effective for menstrual disorders (Thomas and Kaliappan, 1985) may be extensively used to help women who may be suffering from depression.

Menarche, the first menstrual experience, has often been considered to be quite significant by Western gynaecologists for the occurrance of menstrual disorders (Dawood, 1985; Burratti, Jeffcoate and Dewhurst, 1985). It leads to traumatic

experiences which leave their scar on the personality of the individual. But our results fail to substantiate such claims. The results obtained by us may be interpreted in terms of our cultural milieu. Women, in our society, whether we like or not, are trained from the early childhood to play a secondary role. The concept of feminity among Indian women is very different than the meaning assigned to it by the Western woman. Generally, women subsume the secondary role and this does not lead to conflict situation. Menstruation, an important aspect of womanhood, is accepted and related to various functions of their role. Thus, menarche, early or late, may lose its significance for them. It may not be considered as shocking or volatile, as western women believe. These considerations might have influenced our results.

Age was also found not to influence either duration or the feeling of menstrual discomfort. Age, however, when combined with depression, yielded significant interaction effects. High depression and relatively older subjects had shorter menstrual duration and the differences were found to be statistically significant (Table 21). Here also the pervading influence of depression is at play and lends conformity to the trend of the results obtained earlier (Mendels, 1970; Khatoon, 1986).

We generally feel that the area of 'menstrual pattern' is an unexplored field and demands concerted effort by psychologists

to extensively as well as intensively study the various aspects. The corner stone of women studies should be based on the study of menstrual patterns, specially duration and the feeling of discomfort. Longitudinal studies starting before the age of puberty and extending to early adulthood should be taken up in right earnestness.

There may be a host of other independent variables not covered by the present investigator, which should be explored and incorporated by future researchers.

Psychologists should evolve their own strategy for such studies and not solely depend on the concepts and terminologies enunciated by gynaecologists, because they often group together various factors and label them as psychosomatic. This detracts from the applicability of such findings at the level of psychological explanations.

Immense possibilities of controlled experimentation also exist. Before and after design experiment by interpolating sex information and determining its influence on duration and feeling of discomfort may be investigated.

The adverse effect of noise on menstrual duration and discomfort also needs attention of researchers. Comparison among subjects living in places of 'high' and 'low' noise level may be undertaken.

Varying the age groups is also worth studying. Many other

personality variables such as locus of control, dependence proneness, etc., may also be studied to determine their influence on duration and feeling of discomfort. Then there may be many demographic variables which deserve to be tested for their influence on menstrual pattern.

Implications

It has been observed that most of the subjects had vague idea of the menstrual process due to which it is imperative that a system of information dissemination should be evolved to educate young girls before they attain the age at which the menstruation may start. Lack of proper information may pose various adjustment problems for women. The problem may become further confounded when lack of proper information is combined with misconceptions.

Moos (1968) considers depression to be a symptom of menstrual distress. It was observed by Khatoon (1986) that physical discomfort may influence the feeling of being unwell and may make the person depressed. Such feelings when combined with negative attitudes towards menstruation may enhance the feeling of depression. Thus, it is important to minimise the feeling of discomfort, lessen the state of depression and to bring out attitudinal change among women towards menstruation to pave the way for their better adjustment.

It has been reported that women having shorter menstrual

duration may develop a feeling of inadequacy as far as fulfilling the role assigned to them by our society is concerned. It is true that there is nothing physically wrong with shorter menstrual duration but psychologically it may become significant, if somehow someone develops a feeling that shorter menstrual duration may be an impediment to the process of procreation. They may be frightened of becoming the victim of social stereotype attached to infertile women. This point has been succintly highlighted by Kleegman (1961) who comments that "The barren marriage is a problem as old as the history of mankind. In widely separated cultures and generations, it has been regarded not as an illness but as misfortune and disgrace. The childless woman was the victim of superstition, fear and prejudice, far through the ages, and until our generation, the onus of barrenness usually fell upon female."

The findings seen in this context assume added significance. It means that strategies have to be evolved to lessen depression among women and to educate them that slightly shorter duration may occur and may lead to further complications. It is suggested that psychological technique of behaviour modification may be used to help such persons. Yogic exercises may also be useful for this purpose.

Since depression was found to be the most potent variable that influences menstrual duration and discomfort, it is argued that women should understand this fact, and evolve their own

strategies to counter the feeling of depression. This is pertinent for working women as well as young students and housewives who have to face many difficult situations in home, office, and educational institution. The intense competition impinges upon all the facets of life and may fabricate situations to make the individual depression prone. Then a vicious cycle of feeling greater menstrual discomfort and shortening of duration may further make the life unbearable. In such a case the need for guidance and counselling becomes important.

It is also pertinent to suggest that an in-depth study of factors responsible for menstrual duration needs to be conducted, both at the psychological level and at the physiological level. There may be physiological correlates of menstrual duration which must be expounded, and their relationship with depression clearly enunciated, so that remedial measures for depression amongst women may be contemplated.

The present investigation, together with an earlier investigation conducted by the present investigator (Khatoon, 1986) has brought to light many aspects of the menstrual pattern which are important. These findings have many applied implications and these findings should not be left to the pages of the thesis. Rather their use for behaviour development be made for the betterment of women of our country.

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APPENDICES

APPENDIX - I

Please put a tick mark (✓) within the bracket provided against each question.

1. What was age at the time of your first menses.

8 - 10 ( )
11 - 13 ( )
14 - 16 ( )
17 - 19 ( )

2. Your menstrual period lasts for how many days

Menstrual Duration

0 - 1 ( )
2 - 3 ( )
4 - 5 ( )
6 - 7 ( )
8 - 9 ( )

3. Generally how many days elapse between the first and the next menstrual period

	Present	Initial
22 - 24	( )	( )
25 - 27	( )	( )
28 - 30	( )	( )
31 - 33	( )	( )

4. Do you experience pain during the following phases.

	No	Slight	Moderate	Excessive
Premenstrual ...	( )	( )	( )	( )
Menstrual ...	( )	( )	( )	( )

5. For how long the pain persists?

Hours of pain	
0 - 12	( )
12 - 24	( )
24 - 48	( )
48 - 72	( )

6. Do you experience irregularity during the given age?

14 - 16	( )
17 - 19	( )
20 - 24	( )
25 - 30	( )

7. Do you feel menstrual discomfort? If yes, how frequent you experience?

Almost every month	...	( )
Often	...	( )
Once in a while	...	( )
Never	...	( )

8. How intense is the discomfot?

Slight	...	( )
Moderate	...	( )
Severe	...	( )

9. Do you feel tension associated with menses? Please indicate its frequency.

Almost every month	...	( )
Often	...	( )
Once in a while	...	( )
Never	...	( )

10. Please indicate, how intense the tension is?

Slight	...	( )
Moderate	...	( )
Severe	...	( )

11. Do you feel lethargic feeling associated with menses? If you have this difficulty, please indicate how frequent you experience.

Almost every month	...	( )
Often	...	( )
Once in a while	...	( )
Never	...	( )

12. How intense is the feeling of lithargy?

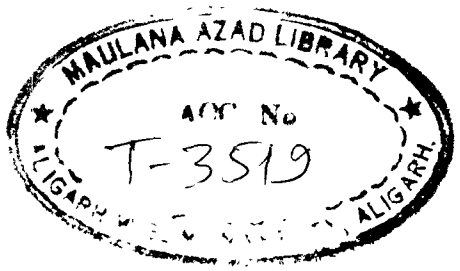
Slight	...	( )
Moderate	...	( )
Severe	...	( )

13. Do you feel irritability during the menses?

Almost every month	...	( )
Often	...	( )
Once in a while	...	( )
Never	...	( )

14. If you have this difficulty, indicate the average severity.

Slight	...	( )
Moderate	...	( )
Severe	...	( )



15. Do you feel depressed, pre-or during menses?

Almost every month	...	( )
Often	...	( )
Once in a while	...	( )
Never	...	( )

16. Please also indicate its average severity.

Slight	...	( )
Moderate	...	( )
Severe	...	( )

17. Is your menses accompanied by pain?

Yes	...	( )
No	...	( )

18. Are your menses regular at present?

Yes	...	( )
No	...	( )

19. Does the menstrual pain persists with increased flow?

Yes	...	( )
No	...	( )

20. Is the discomfort accompanied by decrease in menstrual flow?

Yes	...	( )
No	...	( )

21. Had you prior knowledge of menstrual process when you experience for the first time?

Yes	...	( )
No	...	( )

22. Did you take it as natural?

Yes	...	( )
No	...	( )

23. What was your attitude towards menstrual process at the time of menarche?

Positive	...	( )
Negative	...	( )

Please furnish the following information:

Date of birth	_____
Place of birth (Rural/Urban)	_____
Class in which the subject studying	_____
Marital Status	_____
Father's education	_____
Profession	_____
Income	_____
Mother's Education	_____
Profession	_____
Income	_____

Table 1

Noise and Menstrual Cycle
K-S Test

Noise		Menstrual Cycle Length			
		23	26	29	32
Before Exposure	f - 16	1	4	6	5
	CFP	.06	.31	.68	1.00
After Exposure	f - 16	3	4	7	2
	CFP	.18	.43	.87	1.00
Difference in CFP		.12	.12	.19	

$D = .19$

$n_1 = 16$

$n_2 = 16$

$$K\text{-}s = 4\,D^2 \left[\frac{n_1,\ n_2}{n_1 + n_2}\right]$$

$$4(.19)^2 \left[\frac{16,\ 16}{16 + 16}\right]$$

$$= 1.15$$

APPENDIX - III

Table 2

Noise and Menstrual Duration
K-S Test

Noise		Menstrual Duration in days			
		2.5	4.5	6.5	8.5
Before	f	2	5	7	2
Exposure	CFP	.12	.43	.93	1.00
After	f	2	2	11	1
Exposure	CFP	.12	.25	.93	1.00
Difference in CFP		0	.18	0	0

$D = .18$

$n_1 = 16$

$n_2 = 16$

$$K\text{-}S = 4\ (.18)^2 \left[\frac{16,\ 16}{16 + 16}\right]$$

$$= 1.03$$

APPENDIX - IV

Table 3

Noise and Menstrual Discomfort

K-S Test

Noise		Menstrual Discomfort			
		0	1	2	3
Before Exposure	f	4	5	5	2
	CFP	.25	.56	.87	1.00
After Exposure	f	0	6	8	2
	CFP	0	.37	.87	1.00
Difference in CFP		.25	.19	-	-

$D = .25$

$n_1 = 16$

$n_2 = 16$

$$K\text{-}s = 4(.25)^2 \left[\frac{16,\ 16}{16 + 16}\right]$$

$$= 2.00$$

APPENDIX - V

Table 5

Influence of Anxiety and Depression on Menstrual Cycle Length

ANOVA

Groups	$\sum x$	$\sum x^2$
A(h) + D(h)	441	13071
A(h) + D(l)	432	12558
A(l) + D(h)	408	11166
A(l) + D(l)	429	12339

$$\text{Total SS} = (13071 + 12558 + 11166 + 12339) - \frac{(441 + 432 + 408 + 429)^2}{60}$$

$$= 399$$

$$\text{Among SS} = \frac{(441)^2}{15} + \frac{(432)^2}{15} + \frac{(408)^2}{15} + \frac{(429)^2}{15} - \frac{(441 + 432 + 408 + 429)^2}{60}$$

$$= 39$$

$$\text{Between Anxiety} = \frac{(441 + 408)^2}{15 + 15} + \frac{(432 + 429)^2}{15+15} - \frac{(441 + 432 + 408 + 429)^2}{60}$$

$$= 2.4$$

Between Depression

$$= \frac{(441 + 432)^2}{15 + 15} + \frac{(408 + 429)^2}{30} - \frac{(441 + 432 + 408 + 429)^2}{60}$$

$$= 21.6$$

With SS = Total SS - among SS

= 399 - 39

= 360

Interaction = Among SS - Anxiety - Depression

= 39 - 2.4 - 21.6

= 15

APPENDIX VI

Table 6

Influence of Anxiety (A) and Depression (B) on Menstrual Duration

ANOVA

Groups	$\sum x$	$\sum x^2$
A(h) + (D(h)	63.5	307.75
A(h) + D(l)	67.0	149.75
A(l) + D(h)	45.0	319.75
A(l) + D(l)	79.5	443.75

$$\text{Total SS} = (307.75 + 149.75 + 319.75 + 443.75) - \frac{(63.5 + 67.0 + 45.0 + 79.5)}{60}$$

$$= 137.25$$

$$\text{Among SS} = \frac{(63.5)}{15}^2 + \frac{(67)}{15}^2 + \frac{(45)}{15}^2 + \frac{(79.5)}{15}^2 - \frac{(63.5 + 45 + 67 + 79.5)}{60}^2$$

$$= 40.67$$

$$\text{Between Anxiety} = \frac{(63.5 + 67)}{15 + 15}^2 + \frac{(45 + 79.5)}{15 + 15}^2 - \frac{(63.5 + 67 + 45 + 79.5)}{60}^2$$

$$= .59$$

Between Depression

$$= \frac{(63.5 + 45)^2}{15 + 15} + \frac{(67 + 79.5)^2}{15 + 15} - \frac{(63.5+67+45+79.5)^2}{60}$$

$$= 24.05$$

Within SS

$$= 137.25 - 40.67$$

$$= 96.58$$

Interaction SS

$$= 40.67 - .59 - 24.05$$

$$= 16.03$$

Table 7

Depression and Menstrual Duration
t-test

Groups	Mean duration in days	Σx^2
Depression High	3.63	61.26
Depression Low	4.90	43.20

$$t = \frac{\bar{X}_1 - \bar{X}_2}{s\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

$$s = \sqrt{\frac{\Sigma x_1^2 + \Sigma x_2^2}{n_1 + n_2 - 2}}$$

$$s = \sqrt{\frac{61.26 + 43.2}{30 + 30 - 2}}$$

$$t = \frac{3.63 - 4.9}{1.34\sqrt{\frac{1}{30} + \frac{1}{30}}}$$

$$s = 1.34$$

$$t = 7.09$$

Table 8

Interaction Effect (A x B) on Menstrual Duration

Group	Mean Duration in days	Σx^2
A(h) + D(h)	4.23	38.89
A(h) + D(l)	4.49	16.00

$$t = \frac{4.23 - 4.49}{1.40\sqrt{\frac{1}{15} + \frac{1}{15}}}$$

$$s = \sqrt{\frac{38.89 + 16.00}{15 + 15 - 2}}$$

$$s = 1.40$$

$$t = 1.07$$

Groups	Mean Duration in days	Σx^2
A(h) + D(h)	4.23	38.89
A(l) + D(h)	3.00	11.75

$$t = \frac{4.23 - 3.00}{1.34\sqrt{\frac{1}{15}\ \frac{1}{15}}}$$

$$s = \sqrt{\frac{38.89 + 11.75}{15 + 15 - 2}}$$

$$s = 1.34$$

$$t = 4.84$$

Groups compared	$\bar{X}$	$\sum x^2$
A(h) + D(h)	4.23	38.89
A(l) + D(l)	5.30	22.40

$$t = \frac{4.23 - 5.3}{\sqrt{\frac{1}{15} + \frac{1}{15}}} \qquad s = \sqrt{\frac{38.89 + 22.4}{15 + 15 - 2}}$$

$t = 4.62$ $\qquad$ $s = 1.47$

Groups	$\bar{X}$	$\sum x^2$
A(h) + D(l)	4.49	16.00
A(l) + D(h)	3.00	11.75

$$t = \frac{4.49 - 3.00}{\sqrt{\frac{1}{15} + \frac{1}{15}}} \qquad s = \sqrt{\frac{16.00 + 11.75}{15 + 15 - 2}}$$

$t = 4.33$ $\qquad$ $s = .99$

Groups	$\bar{X}$	$\sum x^2$
A(h) + B(l)	4.49	16.00
A(l) + B(l)	5.30	22.40

$$t = \frac{4.49 - 5.3}{1.17\sqrt{\frac{1}{15} + \frac{1}{15}}}$$

$$s = \sqrt{\frac{16.00 + 22.4}{15 + 15 - 2}}$$

$t = 2.78$

$s = 1.17$

Group	$\bar{X}$	$\sum x^2$
A(l) + B(h)	3.00	11.75
A(l) + B(l)	5.30	22.40

$$t = \frac{3.00 - 5.3}{1.10\sqrt{\frac{1}{15} + \frac{1}{15}}}$$

$$s = \sqrt{\frac{11.75 + 22.4}{15 + 15 - 2}}$$

$s = 1.10$

$t = 7.44$

APPENDIX VII

Table 9

Influence of Anxiety (A) and Depression (B) on Menstrual Discomfort

ANOVA

Groups	$\sum x$	$\sum x^2$
A(h) + B(h)	44	130
A(l) + D(h)	30	72
A(h) + B(l)	16	28
A(l) + D(l)	18	34

$$\text{Total SS} = (130 + 72 + 28 + 34) - \frac{(44 + 30 + 16 + 18)^2}{60}$$

$$= 69.6$$

$$\text{Among SS} = \frac{(44)^2}{15} + \frac{(30)^2}{15} + \frac{(16)^2}{15} + \frac{(18)^2}{15} - \frac{(44 + 30 + 16 + 18)^2}{60}$$

$$= 33.32$$

Between Anxiety

$$= \frac{(44 + 16)^2}{15 + 15} + \frac{(30 + 18)^2}{15 + 15} - \frac{(44+30+16+18)^2}{60}$$

$$= 2.4$$

Between Depression

$$= \frac{(44 + 30)^2}{15 + 15} + \frac{(16 + 18)^2}{15 + 15} - \frac{(44+30+16+18)^2}{60}$$

$$= 26.66$$

Within SS

$$= 69.6 - 33.32$$

$$= 36.28$$

Interaction SS

$$= 33.32 - 2.4 - 26.66$$

$$= 4.26$$

Table 10

Depression and Menstrual Discomfort
t-test

Groups compared	$\bar{X}$	$\sum x^2$
Depression High	2.46	19.42
Depression Low	1.13	23.26

$$t = \frac{2.46 - 1.13}{.85\sqrt{\frac{1}{30} + \frac{1}{30}}}$$

$$s = \sqrt{\frac{19.42 + 23.26}{30 + 30 - 2}}$$

$$s = .85$$

$$t = 4.70$$

Table 11

Interaction Effect of A x B on Menstrual Discomfort

t-test

Groups	$\bar{X}$	$\sum x^2$
A(h) + D(h)	2.93	0.91
A(h) + D(l)	1.06	10.90

$$t = \frac{2.93 - 1.06}{.64\sqrt{\frac{1}{15} + \frac{1}{15}}}$$

$$s = \sqrt{\frac{.91 + 10.90}{15 + 15 - 2}}$$

$t = 3.52$

$s = .64$

Groups	$\bar{X}$	$\sum x^2$
A(h) + D(h)	2.93	0.91
A(l) + D(l)	2.00	12.00

$$t = \frac{2.93 - 2.00}{.67\sqrt{\frac{1}{15} + \frac{1}{15}}}$$

$$s = \sqrt{\frac{.91 + 12.00}{15 + 15 - 2}}$$

$t = 1.83$

$s = .67$

Groups	$\bar{X}$	$\sum x^2$
A(h) + D(h)	2.93	0.91
A(l) + D(l)	1.20	12.40

$$t = \frac{2.93 - 1.2}{.68\sqrt{\frac{1}{15} + \frac{1}{15}}} \qquad s = \sqrt{\frac{.91 + 12.4}{15 + 15 - 2}}$$

$$s = .68$$

$$t = 3.45$$

Groups	$\bar{X}$	$\sum x^2$
A(h) + D(l)	1.06	10.90
A(l) + D(h)	2.00	12.00

$$t = \frac{1.06 - 2.00}{.90\sqrt{\frac{1}{15} + \frac{1}{15}}} \qquad s = \sqrt{\frac{10.90 + 12.00}{15 + 15 - 2}}$$

$$s = .90$$

$$t = 2.48$$

Groups	$\bar{X}$	$\sum x^2$
A(h) + D(1)	1.06	10.90
A(1) + D(1)	1.20	12.40

$$t = .91 \frac{1.06 - 1.2}{\sqrt{\frac{1}{15} + \frac{1}{15}}}$$

$$t = .37$$

$$s = \sqrt{\frac{10.90 + 12.4}{15 + 15 - 2}}$$

$$s = .91$$

Groups	$\bar{X}$	$\sum x^2$
A(1) + D(h)	2.00	12.00
A(1) + D(1)	1.20	12.40

$$t = \frac{2.00 - 1.2}{\sqrt{\frac{1}{15} + \frac{1}{15}}}$$

$$t = 2.18$$

$$s = \sqrt{\frac{12.0 + 12.4}{15 + 15 - 2}}$$

$$s = .93$$

Table 12

Influence of Anxiety, Depression and Age of Menarche on Menstrual Cycle Length

ANOVA

Groups	$\sum x$	$\sum x^2$
1. A(h) + D(h) + M(h)	339	9705
2. A(h) + D(h) + M(l)	330	9156
3. A(h) + D(l) + M(h)	333	9321
4. A(h) + D(l) + M(l)	333	9303
5. A(l) + D(h) + M(h)	333	9285
6. A(l) + D(h) + M(l)	354	10512
7. A(l) + D(l) + M(h)	348	10128
8. A(l) + D(l) + M(l)	336	9468

$$\text{Total SS} = (9705+9156+9321+9303+9285+10512+10128+9468) - \frac{(339+330+333+333+333+354+348+336)^2}{96} = 602.7$$

$$\text{Among SS} = \frac{(339)^2}{12} \frac{(330)^2}{12} \frac{(333)^2}{12} \frac{(333)^2}{12} \frac{(333)^2}{12} \frac{(354)^2}{12} \frac{(348)^2}{12} \frac{(336)^2}{12} - \frac{(339+330+333+333+333+354+348+336)^2}{96} = 41.07$$

$$\text{Within SS} = 662.7 - 41.7 = 561$$

Between Anxiety

$$= \frac{(339 + 330 + 333 + 333)^2}{12(4)} + \frac{(333 + 354 + 348 + 336)^2}{12(4)} - \frac{(339 + 330 + 333 + 333 + 333 + 354 + 348 + 336)^2}{96}$$

$$= 13.56$$

SS Between Depression

$$= \frac{(339 + 330 + 333 + 354)^2}{12(4)} + \frac{333 + 333 + 348 + 336)^2}{12(4)}$$

$$- \frac{(339 + 330 + 333 + 333 + 333 + 354 + 348 + 336)^2}{96}$$

$$= 0.45$$

SS Between Age of Menarche

$$= \frac{(339 + 333 + 333 + 348)^2}{12(4)} + \frac{(330 + 333 + 354 + 336)^2}{12(4)}$$

$$- \frac{(339 + 330 + 333 + 333 + 333 + 354 + 348 + 336)^2}{96}$$

=

Interaction $$\left|\frac{(a + d) - (B + c)}{(4)\ (n)}\right|^2$$

Two way table for anxiety and Depression.

A X B

	B_1		B_2		Σ
A_1	669	(a)	666	(b)	1445
A_2	687	(c)	684	(d)	1371
Σ	1356		1350		2706

AXB $$\left[\frac{(669 + 684) - (666 - 687)}{(4)\ (24)}\right]^2$$

$$\left[\frac{1354 - 1353}{96}\right]^2$$

=

Two way table for Anxiety and Menarche :

A x C

	C_1	C_2	$\sum$
A_1	669	666	1338
A_2	681	690	1371
$\sum$	1350	1356	2706

$$A \times C = \left[\frac{(669 + 690) - (666 + 681)}{(4)\ (24)} \right]^2$$

$$= \left[\frac{1359 - 1347}{96} \right]$$

$$= 1.6$$

Two way table for Depression and Age of Menarche

B x C

	C_1	C_2	Σ
B_1	672	684	1356
B_2	681	669	1350
Σ	1353	1353	2706

$$B \times C = \left[\frac{(672 + 669) - (684 + 681)}{(4)\ (24)} \right]^2$$

$$= \left[\frac{1341 - 1365}{96} \right]^2$$

$$= 6.0$$

A x B x C = Among S° - Sum of sums of squares.

= 41.7 - 21.17

= 20.53

Table 13

Influence of Anxiety, Depression and Age of Menarche on Menstrual Duration

ANOVA

Groups	$\sum x$	$\sum x^2$	$\bar{X}$
A(h) + D(h) + M(h)	58	331	4.83
A(h) + D(h) + M(l)	60	341	5.00
A(h) + D(l) + M(h)	62	331	5.16
A(h) + D(l) + M(l)	64	369	5.33
A(l) + D(h) + M(h)	50	231	4.16
A(l) + D(h) + M(l)	36	117	3.00
A(l) + D(l) + M(h)	74	479	6.16
A(l) + D(l) + M(l)	66	375	5.50

$$\text{Total SS} = (311 + 341 + 331 + 369 + 231 + 117 + 479 + 375) - \frac{(58 + 60 + 62 + 64 + 50 + 36 + 74 + 66)^2}{96}$$

$$= 252.96$$

$$\text{Among SS} = \left(\frac{58}{12}\right)^2 + \left(\frac{60}{12}\right)^2 + \left(\frac{62}{12}\right)^2 + \left(\frac{64}{12}\right)^2 + \left(\frac{50}{12}\right)^2 + \left(\frac{36}{12}\right)^2 + \left(\frac{74}{12}\right)^2 + \left(\frac{66}{12}\right)^2 - \frac{(58 + 60 + 72 + 64 + 50 + 36 + 74 + 66)^2}{96}$$

$$= 76.61$$

$$\text{Within SS} = \text{Total SS} - \text{Amont SS}$$

$$= 252.96 - 76.61$$

SS between Anxiety

$$= \frac{(58 + 60 + 62 + 64)^2}{12(4)} + \frac{(50 + 36 + 74 + 66)^2}{12(4)}$$

$$- \frac{(58 + 60 + 62 + 64 + 50 + 36 + 74 + 66)^2}{96}$$

$$= 3.37$$

SS between Depression

$$= \frac{(58 + 60 + 50 + 36)^2}{12(4)} + \frac{(62 + 64 + 74 + 66)^2}{12(4)}$$

$$- \frac{(58 + 60 + 62 + 64 + 50 + 36 + 74 + 66)^2}{96}$$

$$= 40.04$$

SS between Age of Menarche

$$= \frac{(58 + 62 + 50 + 74)^2}{12(4)} + \frac{(60 + 64 + 36 + 66)^2}{12(4)}$$

$$- \frac{(58 + 60 + 62 + 64 + 50 + 36 + 74 + 66)^2}{96}$$

$$= 3.37$$

$$\text{Interaction} = \left[\frac{(a + d) - (b + c)}{4n} \right]^2$$

Two way table for Anxiety and Depression

A x B

	B_1	B_2	Σ
A_1	118 (a)	126 (b)	224
A_2	86 (c)	140 (d)	226
Σ	202	266	470

$$\text{A x B} = \left[\frac{(118 + 140) - (126 + 86)}{(4)\ (24)} \right]^2$$

$$= \left[\frac{258 - 212}{96} \right]^2$$

$$= \left[\frac{46}{96} \right]^2$$

$$= 220.4$$

$$\text{Interaction} = \left[\frac{(a + d) - (b + c)}{4n} \right]^2$$

Two way table for Anxiety and Age of Menarche

A x C

	C_1	C_2	Σ
A_1	120 (a)	124 (b)	244
A_2	124 (c)	102 (d)	226
Σ	244	226	470

$$\text{A x C} = \left[\frac{(120 + 102) - (124 + 124)}{(4)\ (24)} \right]^2$$

$$= \left[\frac{222 - 248}{96} \right]^2$$

$$= \left[\frac{26}{96} \right]^2$$

$$= 7.04$$

$$\text{Interaction} = \left[\frac{(a + d) - (b + c)}{4n} \right]^2$$

Two way table for Depression and Age of Menarche

B x C

	C_1	C_2	Σ
B_1	108 (a)	96 (b)	204
B_2	136 (c)	130 (d)	266
Σ	244	226	470

$$B \times C = \left[\frac{(108 + 130) - (96 + 136)}{(4)\ (24)} \right]^2$$

$$= \left[\frac{238 - 232}{96} \right]^2$$

$$= .37$$

Interaction A x B C = Among SS - (SSA + SSB + SSC + SS AxB + SSA x C + SS B x C)

$$A \times B \times C = 76.61 - (3.37 + 40.04 + 3.37 + 22.04 + 7.04 + .37)$$

$$= 76.61 - 76.23$$

$$= .38$$

Table 14

Depression and Menstrual Duration
t-test

Group	$\bar{X}$	$\sum x^2$
Depression High	4.25	132.88
Depression Low	5.54	80.76

$$t = 1.50 \frac{4.25 - 5.54}{\sqrt{\frac{1}{48} + \frac{1}{48}}}$$

$$s = \sqrt{\frac{132.88 + 80.76}{48 + 48 - 2}}$$

$$s = 1.50$$

$$t = 9.67$$

Table 15

Interaction Effect A x B on Menstrual duration

t-test

Groups	$\bar{X}$	$\sum x^2$
A(h) + D(h)	4.91	71.64
A(h) + D(l)	5.25	38.44

$$t = \frac{4.91 - 5.25}{\sqrt{\frac{1}{24} + \frac{1}{24}}}$$

$$s = \sqrt{\frac{71.64 + 38.44}{24 + 24 - 2}}$$

$$t = 1.86$$

$$s = 1.54$$

Groups	$\bar{X}$	$\sum x^2$
A(h) + D(h)	4.91	71.64
A(l) + D(h)	3.58	39.68

$$t = 1.55 \frac{4.91 - 3.58}{\sqrt{\frac{1}{24} + \frac{1}{24}}} \qquad s = \sqrt{\frac{71.64 + 39.68}{24 + 24 = 2}}$$

$t = 7.36$ $\qquad s = 1.55$

Groups	$\bar{X}$	$\sum x^2$
A(h) + D(h)	4.91	71.64
A(l) + D(l)	5.83	37.12

$$t = 1.53 = \frac{4.91 - 5.83}{\sqrt{\frac{1}{24} + \frac{1}{24}}} \qquad s = \sqrt{\frac{71.64 + 37.12}{24 + 24 - 2}}$$

$s = 1.53$

$t = 5.02$

Groups	$\bar{X}$	$\sum x^2$
A(h) + D(l)	5.25	38.44
A(l) + D(h)	3.58	39.68

$$t = 1.30 \frac{5.25 - 3.58}{\sqrt{\frac{1}{24} + \frac{1}{24}}} \qquad s = \sqrt{\frac{38.44 + 39.68}{24 + 24 - 2}}$$

$t = 7.74$ $\qquad s = 1.30$

Groups	$\bar{X}$	$\sum x^2$
A(h) + D(l)	5.25	38.44
A(l) + D(l)	5.83	37.12

$$t = 1.28 \qquad \frac{5.25 - 5.83}{\sqrt{\frac{1}{24} + \frac{1}{24}}} \qquad s = \sqrt{\frac{38.44 + 37.12}{24 + 24 - 2}}$$

$$t = 2.65 \qquad s = 1.28$$

Groups	$\bar{X}$	$\sum x^2$
A(l) + D(h)	3.58	39.68
A(l) + D(l)	5.83	37.12

$$t = 1.29 \qquad \frac{3.58 - 5.83}{\sqrt{\frac{1}{24} + \frac{1}{24}}} \qquad s = \sqrt{\frac{39.68 + 37.12}{24 + 24 - 2}}$$

$$t = 10.36 \qquad s = 1.29$$

APPENDIX - X

Table 16

Influence of Anxiety, Depression and Age of Menarche on Menstrual Discomfort

ANOVA

Groups	$\sum x$	$\sum x^2$
A(h) + D(h) + M(h)	32	90
A(h) + D(h) + M(l)	28	74
A(h) + D(l) + M(h)	18	38
A(h) + D(l) + M(l)	15	25
A(l) + D(h) + M(h)	27	71
A(l) + D(h) + M(l)	32	94
A(l) + D(l) + M(h)	19	37
A(l) + D(l) + M(l)	17	37

$$\text{Total SS} = (90 + 74 + 38 + 25 + 71 + 94 + 37 + 37) - \frac{(32 + 28 + 18 + 15 + 27 + 32 + 19 + 17)^2}{96}$$

$$= 97.84$$

$$\text{Among SS} = \frac{(32)^2}{12} + \frac{(28)^2}{12} + \frac{(18)^2}{12} + \frac{(15)^2}{12} + \frac{(27)^2}{12} + \frac{(32)^2}{12} + \frac{(19)^2}{12} + \frac{(17)^2}{12}$$

$$= 28.49$$

$$\text{Within SS} = \text{Total SS} - \text{Among SS}$$

$$= 97.84 - 28.49$$

$$= 69.35$$

SS between Anxiety

$$= \frac{(32 + 28 + 18 + 15)^2}{12(4)} + \frac{(27 + 32 + 19 + 17)^2}{12(4)} - \frac{(32 + 28 + 18 + 15 + 27 + 32 + 19 + 17)^2}{96}$$

$$= .04$$

SS between Depression

$$= \frac{(32 + 28 + 27 + 32)^2}{12(4)} + \frac{(18 + 15 + 19 + 17)^2}{12(4)} - \frac{(32 + 28 + 18 + 15 + 27 + 32 + 19 + 17)^2}{96}$$

$$= 26.04$$

SS between Age of Menarche

$$= \frac{32 + 18 + 27 + 19)^2}{12(4)} + \frac{(28 + 15 + 32 + 17)^2}{12(4)} - \frac{(32 + 28 + 18 + 15 + 27 + 32 + 19 + 17)^2}{96}$$

$$= .17$$

$$\text{Interaction} + \left[\frac{(a + d) - (b + c)}{4n}\right]^2$$

1. Two way table for Anxiety and Depression.

	B_1	B_2	$\sum$
A_1	60 (a)	33 (b)	93
A_2	59 (c)	36 (d)	95
$\sum$	119	69	188

$$A \times B = \left[\frac{(60 + 36) - (33 + 54)}{(4)(24)}\right]^2$$

$$= \left|\frac{96 - 92}{96}\right|^2$$

$$= \left(\frac{4}{96}\right)^2$$

$$= \frac{16}{96}$$

$$= .16$$

2. Two way table of Anxiety and Age of Menarche : A x C

	C_1	C_2	Σ
A_1	$50^{(a)}$	$43^{(b)}$	93
A_2	$46^{(c)}$	$49^{(d)}$	95
Σ	96	92	188

$$A \times C = \left[\frac{(50 + 49) - (43 + 46)}{(4)\ (24)} \right]^2$$

$$= \left[\frac{99 - 89}{96} \right]$$

$$= \frac{100}{96}$$

$$= 1.04$$

3. Two way table of Depression and Menarche

	C_1	C_2	Σ
B_1	59 (a)	60 (b)	119
B_2	37 (c)	32 (d)	69
Σ	96	92	188

$$B \times C = \left[\frac{(59 + 32) - (60 + 37)}{(4)\ (24)} \right]^2$$

$$= \left[\frac{91 - 97}{96} \right]^2$$

$$= \left[\frac{6}{96} \right]^2$$

$$= \frac{36}{96}$$

$$= .37$$

Interaction A x B x C = Among SS - Sum of A,B,C, A x B and A x C + B x C.

$$= 28.49 - 27.82$$

$$= .67$$

Table 17

Depression and Menstrual Discomfort
t-test

Groups	$\bar{X}$	$\sum x^2$
Depression High	2.47	33.94
Depression Low	1.43	37.74

$$t = .87 \frac{2.47 - 1.43}{\sqrt{\frac{1}{48} + \frac{1}{48}}} \qquad s = \sqrt{\frac{33.94 + 37.74}{48 + 48 - 2}}$$

$t = 4.52$ $\qquad$ $s = .87$

APPENDIX - XI

Table 18

Influence of Anxiety, Depression and Age of the subjects on Menstrual Cycle Length

ANOVA

Groups compared	$\sum x$	$\sum x^2$
A(h) + D(h) + Age(h)	316	9176
A(h) + D(h) + Age(l)	310	8774
A(h) + D(l) + Age(h)	325	9653
A(h) + D(l) + Age(l)	295	7967
A(l) + D(h) + Age(h)	310	8828
A(l) + D(h) + Age(l)	307	8663
A(l) + D(l) + Age(h)	302	8408
A(l) + D(l) + Age(l)	310	8792

$$\text{Total SS} = (9176 + 8774 + 9653 + 7967 + 8828 + 8663 + 8408 + 8792) - \frac{(316 + 310 + 325 + 295 + 310 + 307 + 302 + 310)^2}{88}$$

$$= 651.62$$

$$\text{Among SS} = \frac{(316)^2}{11} + \frac{(310)^2}{11} + \frac{(325)^2}{11} + \frac{(295)^2}{11} + \frac{(310)^2}{11} + \frac{(302)^2}{11} + \frac{(310)^2}{11} - \frac{(316 + 310 + 325 + 295 + 310 + 307 + 302 + 310)^2}{88}$$

$$= 50.52$$

Within SS = Total SS - Among SS

= 651.62 - 50.52

= 601.1

SS between Anxiety

$$= \frac{(316 + 310 + 325 + 295)^2}{11\ (4)} + \frac{(310 + 307 + 302 + 310)^2}{11\ (4)} - \frac{(316 + 310 + 325 + 295 + 310 + 307 + 302 + 310)^2}{88}$$

= 3.28

SS between Depression

$$= \frac{(316 + 310 + 310 + 307)^2}{11(4)} + \frac{(325 + 295 + 302 + 310)^2}{11(4)} - \frac{(316 + 310 + 325 + 295 + 310 + 307 + 302 + 310)^2}{88}$$

= 1.38

SS between Age of the Subjects

$$= \frac{(316 + 325 + 310 + 302)^2}{11(4)} + \frac{(310 + 295 + 307 + 310)^2}{11(4)} - \frac{(316 + 310 + 325 + 295 + 310 + 307 + 302 + 310)^2}{88}$$

= 10.92

Interaction $\left[\frac{(a + d) - (b + c)}{4n} \right]$

Two way table for Anxiety and Depression: A x B

	B_1	B_2	$\sum$
A_1	$626^{(a)}$	$620^{(b)}$	946
A_2	$617^{(c)}$	$612^{(d)}$	1229
$\sum$	1243	1232	2475

$$A \times B = \left[\frac{(626 + 612) - (620 + 617)}{(4)(22)} \right]^2$$

$$= \left[\frac{1238 - 1237}{88} \right]^2$$

$$= .01$$

Two way Table for Anxiety and Age : A x c

	C_1	C_2	$\sum$
A_1	$641^{(a)}$	$605^{(b)}$	1246
A_2	$612^{(c)}$	$617^{(d)}$	1229
$\sum$	1253	1222	2475

$$A \times C = \left[\frac{(641 + 617) - (605 + 612)}{(4)\ (22)} \right]^2$$

$$= \left[\frac{1258 + 1217}{88} \right]^2$$

$$= \left[\frac{41}{88} \right]^2$$

$$= 19.10$$

Two way table for Depression and Age : B x C

	C_1	C_2	$\sum$
B_1	626	617	1243
B_2	627	605	1232
$\sum$	1253	1222	2475

$$B \times C = \left[\frac{(626 + 605) - (617 + 627)}{(4)(22)} \right]^2$$

$$= \left[\frac{1231 - 1244}{88} \right]^2$$

$$= 1.92$$

A x B x C = Among SS - Sum of sums of square

= 50.52 - 36.61

= 13.91

Table 19

Influence of Anxiety, Depression and Age of subjects on Menstrual Duration

ANOVA

Groups	$\sum x$	$\sum x^2$
A(h) + D(h) +Age(h)	37.5	138.75
A(h) + D(h) + Age(l)	53.5	266.75
A(h) + D(l) + Age(h)	53.5	282.75
A(h) + D(l) + Age(l)	49.5	238.75
A(l) + D(h) + Age(h)	39.5	168.75
A(l) + D(h) + Age(l)	49.5	262.75
A(l) + D(l) + Age(l)	57.5	310.75
A(l) + D(l) + Age(l)	53.5	266.75

Total SS

$$= (138.75 + 266.75 + 282.75 + 238.75 + 168.75 + 262.75 + 310.75 + 266.75) - \frac{(37.5 + 53.5 + 53.5 + 49.5 + 39.5 + 49.5 + 57.5 + 53.5)^2}{88}$$

$$= 171.96$$

Among SS

$$= \frac{(37.5)^2}{11} + \frac{(53.5)^2}{11} + \frac{(53.5)^2}{11} + \frac{(49.5)^2}{11} + \frac{(39.5)^2}{11} + \frac{(49.5)^2}{11} + \frac{(57.5)^2}{11} \quad \frac{(53.5)^2}{11} - \frac{(37.5 + 53.5 + 53.5 + 49.5 + 39.5 + 49.5 + 57.5 + 53.5)^2}{88}$$

$$= 32.3$$

Within SS = total SS - Among SS

= 171.96 - 32.3

= 139.66

SS between Anxiety

$$= \frac{(37.5 + 53.5 + 53.5 + 49.5)^2}{11(4)} + \frac{(39.5 + 49.5 + 57.5 + 53.5)^2}{11(4)} - \frac{(37.5 + 53.5 + 53.5 + 49.5 + 39.5 + 49.5 + 57.5 + 53.5)^2}{88}$$

= .041

SS between Depression

$$= \frac{(37.5 + 53.5 + 39.5 + 49.5)^2}{11(4)} + \frac{(53.5 + 49.5 + 57.5 + 53.5)^2}{11(4)} - \frac{(37.5 + 53.5 + 53.5 + 49.5 + 39.5 + 49.5 + 57.5 + 53.5)^2}{88}$$

= 13.13

SS between Age of the subjects

$$= \frac{(37.5 + 53.5 + 39.5 + 57.5)^2}{11(4)} + \frac{(53.5 + 49.5 + 49.5 + 53.5)^2}{11(4)} - \frac{(37.5 + 53.5 + 53.5 + 49.5 + 39.5 + 49.5 + 57.5 + 53.5)^2}{88}$$

= 3.68

$$\text{Interaction} = \left[\frac{(a + d) - (b + c)}{4\ n} \right]$$

Two way table for Anxiety and Depression : A x B

A x B	B_1	B_2	$\sum$
A_1	$91^{(a)}$	$103^{(b)}$	194
A_2	$89^{(c)}$	$111^{(d)}$	200
$\sum$	180	214	394

$$A \times B = \left[\frac{(91 + 111) - (103 + 89)}{(4)\ (22)} \right]^2$$

$$= \left[\frac{202 - 192}{88} \right]^2$$

$$= 1.136$$

Two way table for Anxiety and Age of the Subjects

A x C

	C_1	C_2	$\sum$
A_1	$91^{(a)}$	$103^{(b)}$	194
A_2	$97^{(c)}$	$103^{(d)}$	200
$\sum$	188	206	394

$$A \times C = \frac{\left[(91 + 103) - (103 + 97)\right]^2}{(4)(22)}$$

$$= \left[\frac{194 - 200}{99}\right]^2$$

$$= .04$$

Two way table for Depression and Age of the subjects

B x C		C_1	C_2	Σ
	B_1	$77^{(a)}$	$103^{(b)}$	180
	B_2	$111^{(c)}$	$103^{(d)}$	214
	Σ	188	206	394

$$B \times C = \frac{\left[(77 + 103) - (103 + 111)\right]^2}{(4)(22)}$$

$$= 13.13$$

Interaction A x B x C = Among SS - Sum of sums of square

= 32.3 - 31.25

= 1.05

Table 20

Depression and Menstrual Duration

t-test

Groups compared	$\bar{X}$	$\sum x^2$
Depression High	4.09	100.28
Depression Low	4.86	58.60

$$t = 1.35 \quad \frac{4.09 - 4.86}{\sqrt{\frac{1}{44} + \frac{1}{44}}} \qquad s = \sqrt{\frac{100.28 + 58.6}{44 + 44 - 2}}$$

$$= 5.19 \qquad s = 1.35$$

Table 21

t-test

Groups compared	$\bar{X}$	$\sum x^2$
Depression High	2.47	14.94
Depression Low	1.68	15.44

$$t = .59 \quad \frac{2.47 - 1.68}{\sqrt{\frac{1}{44} \quad \frac{1}{44}}} \qquad s = \sqrt{\frac{14.94 + 15.44}{44 + 44 - 2}}$$

$$s = .59$$

$$= 2.33$$

Table 21

Interaction effect of B x C on Menstrual Duration

t-test

Groups	$\bar{X}$	$\sum x^2$
B(h) Age(h)	3.5	38.00
B(h) + Age(l)	4.68	47.22

$$t = 1.42 \quad \frac{3.5 - 4.68}{\sqrt{\frac{1}{22} + \frac{1}{22}}} \qquad s = \sqrt{\frac{38.00 + 47.22}{22 + 22 - 2}}$$

$$s = 1.42$$

$$t = 5.98$$

Groups	$\bar{X}$	$\sum x^2$
D(h) + Age(h)	3.50	38.00
D(l) + Age(h)	5.04	33.26

$$t = 1.30 \frac{3.5 - 5.04}{\sqrt{\frac{1}{22} + \frac{1}{22}}} \qquad s = \sqrt{\frac{38.00 + 33.26}{22 + 22 - 2}}$$

$$s = 1.30$$

$$t = 7.15$$

Groups	$\bar{X}$	$\sum x^2$
D(h) + Age(h)	3.50	38.00
D(l) + Age(l)	4.68	23.22

$$t = 1.20 \frac{3.5 + 4.68}{\sqrt{\frac{1}{22} + \frac{1}{22}}} \qquad s = \sqrt{\frac{38.00 + 23.22}{22 + 22 - 2}}$$

$$t = 5.05 \qquad s = 1.20$$

Groups	$\bar{X}$	$\sum x^2$
D(h) + Age(l)	4.68	47.22
D(l) + Age(h)	5.04	33.26

$$t = 1.38 \quad \frac{4.68 - 5.04}{\sqrt{\frac{1}{22} + \frac{1}{22}}} \qquad s = \sqrt{\frac{47.22 + 33.26}{22 + 22 - 2}}$$

$$t = 1.77 \qquad s = 1.38$$

Groups	$\bar{X}$	$\sum x^2$
D(l) + Age(h)	5.04	33.26
D(l) + Age(l)	4.68	23.22

$$t = 1.15 \quad \frac{5.04 - 4.68}{\sqrt{\frac{1}{22} \quad \frac{1}{22}}} \qquad s = \sqrt{\frac{33.26 + 23.22}{22 + 22 - 2}}$$

$$t = 1.47 \qquad s = 1.15$$

APPENDIX - XIII

Table 22

Influence of Anxiety, Depression and Age of Subject on Menstrual Discomfort

ANOVA

Groups	$\sum x$	$\sum x^2$
A(h) + D(h) + Age (h)	27	71
A(h) + D(h) + Age (l)	31	89
A(h) + D(l) + Age (h)	18	34
A(h) + D(l) + Age (l)	17	29
A(l) + D(h) + Age (h)	25	61
A(l) + D(h) + Age (l)	26	64
A(l) + D(l) + Age (h)	20	42
A(l) + D(l) + Age (l)	19	35

$$\text{Total SS} = (71 + 89 + 34 + 29 + 61 + 64 + 42 + 35) - \frac{(27 + 31 + 18 + 17 + 25 + 26 + 20 + 19)^2}{88}$$

$$= 44.45$$

$$\text{Among SS} = \frac{(27)^2}{11} + \frac{(31)^2}{11} + \frac{(18)^2}{11} + \frac{(17)^2}{11} + \frac{(25)^2}{11} + \frac{(26)^2}{11} + \frac{(20)^2}{11} + \frac{(19)^2}{11} - \frac{(27+31+8+17+25+26+20+19)^2}{88}$$

$$= 16.23$$

$$\text{Within SS} = \text{Total SS} - \text{Among SS}$$

$$= 44.45 - 16.23$$

$$= 28.22$$

SS between Anxiety

$$= \frac{(27 + 31 + 18 + 17)^2}{11(4)} + \frac{(25 + 26 + 20 + 19)^2}{11(4)} -$$

$$= \frac{(27 + 31 + 18 + 17 + 25 + 26 + 20 + 19)^2}{88}$$

$$= 0.1$$

SS between Depression

$$= \frac{(27 + 31 + 25 + 26)^2}{11(4)} + \frac{(18 + 17 + 20 + 19)^2}{11(4)} -$$

$$\frac{(27 + 31 + 18 + 17 + 25 + 26 + 20 + 19)^2}{88}$$

$$= 14.17$$

SS between Age of Subjects

$$= \frac{(27 + 18 + 25 + 20)^2}{11(4)} + \frac{(31 + 17 + 26 + 19)^2}{11(4)} -$$

$$\frac{(27 + 31 + 18 + 17 + 25 + 26 + 20 + 19)^2}{88}$$

$$= .01$$

$$\text{Interaction} = \left[\frac{(a + d) - (b + c)}{(4)(n)} \right]^2$$

Two way table for Anxiety and Depression

	B_1	B_2	Σ
A_1	58 (a)	35 (b)	93
A_2	51 (c)	39 (d)	90
Σ	109	74	183

$$A \times B = \left[\frac{(58 + 39) - (35 + 51)}{4(22)} \right]^2$$

$$= 1.37$$

Interaction B x C

	C_1	C_2	$\sum$
B_1	52	57	109
B_2	38	36	74
$\sum$	90	93	183

$$= \left[\frac{(52 + 36) - (57 + 38)}{4(22)}\right]^2$$

$$= .55$$

Interaction A x C

	C_1	C_2	$\sum$
A_1	45	48	93
A_2	45	45	90
$\sum$	90	93	183

$$= \left[\frac{(45 + 45) - (48 + 45)}{4(22)}\right]^2$$

$$= .10$$

Interaction A x B x C = .08

Influence of Anxiety, Depression and Irregularity on Menstrual Duration

ANOVA

Groups	$\sum x$	$\sum x^2$
Ah + D(h)+IR	20.5	95.25
A(h) + D(h) + IR	22.5	117.25
A(h) + D(l) + IR	24.5	131.25
A(h) + D(l) + R	24.5	123.25
A(l) + D(h) + IR	20.5	87.25
A(l) + D(h) + R	28.5	167.25
A(l) + D(l) + IR	34.5	249.25
A(l) + D(l) + R	26.5	145.25

$$\text{Total SS} = (95.25+117.25+131.25+123.25+87.25+167.25+249.25+145.25) - \frac{(20.5+22.5+24.5+20.5+28.5+34.5+26.5)}{40}$$

$$= 95.9$$

$$\text{Among SS} = \frac{(20.5)^2}{5}+\frac{(22.5)^2}{5}+\frac{(24.5)^2}{5}+\frac{(24.5)^2}{5}+\frac{(20.5)^2}{5}+\frac{(28.5)^2}{5}+\frac{(34.5)^2}{5}+\frac{(26.5)^2}{5} - \frac{(20.5 + 22.5 + 24.5 + 24.5 + 20.5 + 28.5 + 34.5 + 26.5)^2}{40}$$

$$= 30.3$$

$$\text{Within SS} = 95.9 - 30.3$$

$$= 65.6$$

$$= \frac{(92)^2}{20} + \frac{(110)^2}{20}$$

SS between Anxiety:

$$= \frac{(92)^2}{20} + \frac{(110)^2}{20} - \frac{(202)^2}{40}$$

$$= 8.1$$

SS between Depression:

$$= \frac{(92)^2}{20} + \frac{(110)^2}{20} - \frac{(202)^2}{40}$$

$$= 8.1$$

SS between Irregularity and Regularity:

$$= \frac{(100)^2}{20} + \frac{(102)^2}{20} - \frac{(202)^2}{40}$$

$$= .1$$

Interaction: Anxiety x Depression

A x B

	B_1	B_2	$\sum$
A_1	43	49	92
A_2	49	61	110
$\sum$	92	110	202

$$= \left[\frac{104 - 98}{40} \right]^2$$

$$= .9$$

Interaction: Anxiety x Irregularity, Regularity

A x C

	C_1	C_2	$\sum$
A_1	45	47	92
A_2	55	55	110
$\sum$	100	102	202

$$= \left[\frac{100 - 102}{40} \right]^2$$

$$= .1$$

Interaction: Depression x Irregularity/Regularity

B x C

	C_1	C_2	$\sum$
B_1	41	51	92
B_2	59	51	110
$\sum$	100	102	202

$$= \left[\frac{92 - 110}{40} \right]^2$$

$$= 8.1$$

Interaction A x B x C = 4.9

Source of variation	Sum of SS	df	Mean SS	F
Anxiety : A	8.1	1	8.1	3.95
Depression : B	8.1	1	8.1	3.95
Irregularity : C	.1	1	.1	.04
Interaction : A x B	.9	1	.9	.43
Interaction : A x C	.1	1	.1	.04
Interaction : B x C	8.1	1	8.1	3.95
Interaction : A x B x C	4.9	1	4.9	2.39
Within error	65.6	32	2.05	
Total	95.9	39		

Influence of Anxiety, Depression and Irregularity on Menstrual Discomfort

ANOVA

Groups	$\sum x$	$\sum x^2$
A(h) + D(h) + IR	12	30
A(h) + D(h) + R	7	11
A(h) + D(l) + IR	6	8
A(h) + D(l) + R	9	21
A(l) + D(h) + IR	11	27
A(l) + D(h) + R	9	21
A(l) + D(l) + IR	11	29
A(l) + D(l) + R	8	16

Total SS = $(30+11+8+21+27+21+29+16) - \frac{(12+7+6+9+11+9+11+8)^2}{40}$

= 29.78

Among SS = $\frac{(12)^2}{5} + \frac{(7)^2}{5} + \frac{(6)^2}{5} + \frac{(9)^2}{5} + \frac{(11)^2}{5} + \frac{(9)^2}{5} + \frac{(11)^2}{5} + \frac{(8)^2}{5} - \frac{(12 + 7 + 6 + 9 + 11 + 9 + 11 + 8)^2}{40}$

= 6.18

Sithin SS = 29.78 - 6.18

= 23.6

SS Between Anxiety:

= $\frac{(34)^2}{20} \quad \frac{(39)^2}{20} - \frac{(73)^2}{40}$

= .63

SS between Depression:

$$= \frac{(39)^2}{20} + \frac{(34)^2}{20} + \frac{(73)^2}{40}$$

$$= .63$$

SS between Irregularity:

$$= \frac{(40)^2}{20} + \frac{(33)^2}{20}$$

$$= 1.23$$

Interaction : Anxiety x Depression

	B_1	B_2	$\sum$
A_1	19	15	34
A_2	20	19	39
$\sum$	39	34	73

$$= \left[\frac{38 - 35}{40}\right]^2$$

$$= .22$$

Interaction: Anxiety x Irregularity.

A x C

	C_1	C_2	$\sum$
A_1	18	16	34
A_2	22	17	39
$\sum$	40	33	73

$$= \left[\frac{35 - 38}{40}\right]^2$$

$$= .22$$

Interaction: Depression x Irregularity

B x C

	C_1	C_2	$\sum$
B_1	23	16	39
B_2	17	17	34
$\sum$	40	33	73

$$= \left[\frac{40 - 33}{40}\right]^2$$

$$= 1.22$$

$$A \times B \times C = 2.03$$

Source of variation	Sum of SS	df	Mean SS	F
Anxiety : A	.63	1	.63	.86
Depression : B	.63	1	.63	.86
Irregularity : C	1.23	1	1.23	1.68
Interaction : A x B	.22	1	.22	.30
Interaction : A x C	.22	1	.22	.30
Interaction : B x C	1.22	1	1.22	1.67
Interaction : A x B x C	2.03	1	2.03	2.78
Within error	23.6	32	.73	
Total	29.78	39		